The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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Contents

NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Other communications relating to advertisements or general matters should be addressed to the Manager.

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The Annual Meeting

THE general impression conveyed by the Reports of the Annual Meeting at Newcastle this week is that the Conferences have been a complete success. If the subjects had not quite the wide range and variety of those discussed in London last year, they had a very definite interest, especially engineering and metallurgical, and the social arrangements were as pleasant and complete as usual. We must defer anything in the nature of a full review to our next issue, but some points may be noted with satisfaction at once. The number present, we learn, was about 250 which, considering the length of the railway journey and the cost of travel, must be considered good. The Council's action in proposing an increase in the annual subscription was, as we anticipated, confirmed, and this may be taken as a informal vote of confidence in those who manage the Society's affairs. The new officers nominated were all elected, and the new members of the Committee are: Dr. T. Howard Butler, Mr. F. H. Carr, Mr. W. H. Coleman, and Mr. F. C. Garrett. The award of the Society's gold medal to M. Paul Kestner elicited from that distinguished Frenchman a charming little speech, charged with the good judgment and fine feeling which make him so welcome a guest. Such an award to a chemical engineer may also be taken as an acknowledgment of the growing importance attached to this subject by the Society. M. Kestner's numerous inventions which have enriched chemical technology include the well-known fans for acid, evaporators, automatic elevators, &c. The President's address, read in his absence owing to illness, but not reported at his own request, was shortly a plea for efficient management, based on human consideration for the workman, mutual trust between employers and men, and scientific control on English lines as distinct from a blind adoption of the American so-called scientific management.

The Chemical Engineering Group Conference on "Filtration"—the fourth of the series—was a complete success, and was marked by the usual enthusiasm—a personal quality which accounts so much for the Group's progress. The tribute paid at the close to the energetic work of Mr. H. Talbot, the secretary, will be generally endorsed by all who know how devotedly he has laboured. The success of the Group, which is proving a source of new life and stimulation to the parent Society, was attributed largely, and rightly, to Mr. Talbot's efforts. At an informal lunch afterwards held, a pleasant incident occurred. The toast of M. Paul Kestner was proposed by Mr. Reavell, who has succeeded Professor Hinchley as Chairman of the Group. M. Kestner, in responding, pleaded for the formation of a union of inventors to form eventually, with branches in other countries, an international union. A French union has already been formed, and a Conference presided over by a French Cabinet Minister will be held at an early date.

We hear with a slightly amused interest of the rather nervous fears expressed in some official quarters concerning the growing influence of THE CHEMICAL AGE. We may have something more to say on this subject later, for the guardianship of scientific knowledge is a rather sacred trust, and any deliberate policy of restricting the free use of it in favour of some particular interest, raises a large ethical as well as business issue. The more devout members of the Society will recall the fate of the man who buried his talent in the earth, in order to make sure of keeping it safe for himself.

A Boom in Patents

THOSE who are interested in the future development of the scientific industries of this country will find considerable food for reflection in an analysis of the present extraordinary boom in applications for Patents. Applications, which before the war usually numbered from five to six hundred per week, have been pouring into the Patent Office at more than double that rate,

and last week they reached a record of over 1800. An inspection of the lists of applications issued weekly by the Patent Office will show that this large expansion of activity is due not merely to an abnormal ingenuity in inventing articles of a non-technical nature to attract the man in the street, but very largely to inventions in the engineering, chemical, and other technical industries.

At the same time, a fact with considerable significance for us in this country is the great increase in the number of applications from abroad under International Convention arrangements to many times their normal number, and no less significant is the fact that a very large proportion of these applications comes from Germany. In the last two weeks alone, over one hundred applications were filed from the firm of Krupp, and while a considerable number of these were for inventions relating to armaments, a substantial residue related to metallurgical processes, and to the machinery and equipment incidental to any large works, and therefore applicable, often with very little modification, to peaceful and commercial purposes. The large German chemical firms such as the Badische Company, and Swiss concerns such as the Society of Chemical Industry in Basle, have also been conspicuous recently in the lists of applications for patents under the International Convention, and it is safe to say that the number of applications from abroad relating to dyestuffs, drugs, synthetic products generally, and fine chemicals has been considerably greater than those from British sources. It must be remembered also that these foreign applications may claim the date accorded to their first application in a foreign country, and in some cases this may extend as far back as 1914, owing to the war. The importance of getting an early date for patents in any process which is being gradually developed will need no emphasis to any inventor who has had to face the competition of a rival working on parallel lines. These International arrangements are, of course, reciprocal, and it rests with British inventors to take full advantage of them in other countries.

It is becoming abundantly clear that the defeat of Germany in the field is not the same thing as her defeat in the markets of the world, even in our own markets, and it is equally clear that a serious bid is being made for the recovery of her supremacy in the chemical industry. Immense progress in chemistry has undoubtedly been made in this country during the war under stress of circumstances, but continuous effort will be necessary to maintain and improve our position in face of the competition of the future.

The Merchant's Place in Trade

THE June trade returns, though less favourable than those for May, are not on the whole unsatisfactory. Imports have risen by £4,157,000, while exports have declined by £2,967,072. The adverse balance of trade, which in May fell to the comparatively low figure of nearly 27 millions, has risen to 34 millions. The value of our exports in May established a new record. A temporary decline from this high level is not really serious, though it must be remembered that the enormous financial burdens the nation has to carry calls for the most vigorous development of our export trade.

It is in this matter that the importance of the trader is increasingly appreciated. For the moment the emphasis is placed on the urgency of production. But when the manufacturer, assuming he can command the necessary labour and raw materials, has produced the goods, it is for the merchant to find the requisite markets for them. This involves the whole science of advertisement, sale, and distribution; and it calls for qualities of mind, business experience, and a network of machinery wholly distinct from and supplementary to what is required for production only. We are all familiar with the pleasant suggestion to eliminate the "middle-man" and to set up the ideal system of direct dealing between the producer and the consumer. But there is a considerable gulf between the producer in England and the consumer in Melbourne, Tokio, or Buenos Ayres. There is the difficulty of discovering the body of consumers needed for this or that product, of persuading the consumer to take British instead of other goods, and of arranging for shipment, payment, and so forth. All this is so distinct as well as complicated a business that the manufacturer who decided to undertake it himself would not be eliminating the "middleman" but becoming a "middleman" himself, and would probably find the work done much less effectively by himself than by the trader who has long specialised in this field, and has old established trade connections spread like a huge nervous system throughout our whole export and import system.

The interests of the manufacturer and the trader are therefore fundamentally one, though in detail occasionally they may appear to conflict, and the more intimate the sympathy and understanding between them the better for both. We believe that Government departments such as the Board of Trade now recognise the essential importance to trade of the distributing section. It is rather singular that while the manufacturing side and the scientific side of chemical industry are so efficiently organised, the merchant class has been almost wholly unorganised. The steps now being taken to bring this large and important class into a great corporate body can have nothing but a good effect on industry, and a body that worthily represents the British merchant's interest will be one that every merchant who takes a proper interest in his own calling will be proud to belong to. It is for the merchant class to realise their own importance and to take the large place which is their due in national trade.

From War to Peace

AN instructive example of the manner in which purely wartime activities can be turned to profitable account in times of peace is to be found in the remarks which Sir Harry McGowan made last week when addressing the shareholders of Explosives Trades, Ltd. During hostilities the various works of this undertaking were mainly engaged in producing material for which there is little call in normal times; and, like many others, the company was suddenly faced with the cancellation of contracts at short notice in November, 1918. The problem, in this case, did not consist of the ordinary one of re-establishing a pre-war industry; it was complicated by the necessity of finding new outlets

and fields of employment for capital rendered unproductive by the war's termination. For its new outlets the company has turned to such products as motors, cycles, and tyres. Broadly, its activities may now be divided into two branches, namely, the chemical division and the metal division. The first embraces the manufacture of industrial explosives for gold-mining, coal-mining, and sporting purposes, as well as general chemicals, gas mantles, and varnishes; while in the second category is the production of hardware goods, motor accessories, and metal powders. In so far as motor-car production is concerned the company's policy finds a parallel in that of the well-known Dupont Company of America, which some year or two ago became partners on a substantial scale in the General Motors Corporation, the largest motor manufacturing concern in the world.

In view of present-day operating costs all industrial undertakings, whose manufacturing stations may have been scattered in different parts of the country, are learning the value of concentration as an aid to effiiciency and economy. In the case of Explosives Trades, Ltd., various interests have been merged. Those factories where the cost of production was excessive have been closed down, and an effort has been made to concentrate on the works where efficiency is on a high scale. The net result is a general lowering of prices. An indication of the wisdom of such a policy may be gained from the fact that although, so far as civil explosives are concerned, the cost of materials has advanced by 150 to 200 per cent., the present day price for the finished product is only 80 per cent. higher than in pre-war times. The company are certainly proving that the process of consolidation with the gradual elimination of superfluous powers of production is a policy which many similarly situated concerns might do well to consider. The one unfortunate element associated with a rearrangement of the kind is that the superfluity applies not only to plant and works but to the staff as well. Staff reducton invariably entails hardship, and to the majority of those in control it is a very difficult matter to decide between their obligations to their staff and their duty to their shareholders.

British Chemical Standards

THE report issued by the British Chemical Standards Association on the work of the first three years (September, 1916, to September, 1919) shows that, though useful results have been achieved, the work is still left to private enterprise. During the period covered, the Association issued thirteen standards, relating to various carbon and alloy steels and irons. A fourteenth standard has since been issued, intended to serve for high-speed tool steels and other recent types of alloy steel. Arrangements are also in progress for a special low phosphorus hematite iron standard containing relatively high titanium, to be issued at an early date; while several standards of other types are at various stages, and will be completed when time can be found to do so. Apart from the preparation and issue of their own standards, the Association has sought to arouse chemists, engineers and others to the importance of the unification of analysis. They have endeavoured to obtain the co-operation of other bodies interested in the subject, but so far without success, and they have decided, therefore, to continue the work on their own lines.

Although confident that their standards will hold their own whether or not any other body also issues standards, they are still willing to hand the whole matter over to a properly constituted central bureau, in which all the scientific societies concerned are adequately represented. They contrast the position in this country with the reception accorded in the United States to a similar movement, which soon received general favour and substantial Government support; but they suggest that this arises from the failure of our scientific bodies to realise the true circumstances. They have confidence that when these are appreciated the same cordial support will be forthcoming from those circles that has been given by so many works and laboratories in this country and abroad. The Association standards, it is stated, are becoming recognised as not only British, but international, and a belief is expressed that they will before long do no small part in bringing about the co-operation of chemists throughout the world. The Association's aims are no doubt praiseworthy, though this opinion implies no censure of the societies who for various reasons have not fallen in with the Association's proposals.

60 per Cent. E.P.D.

IN spite of the strong representations made to the Chancellor of the Exchequer against any increase in the Excess Profits Duty, the House of Commons on Monday decided in favour of its increase from 40 to 60 per cent. The only concession Mr. Chamberlain made was a promise, to which the Government must be strictly kept, that next year the tax should not exceed 40 per cent. It is significant that the tax itself found scarcely a friend in the House, except perhaps on the Labour benches, where any tax is usually popular which does not fall on "the worker." Mr. Chamberlain adhered to the view of its author that it must not be regarded as a permanent means of raising revenue, though it is well not to rely too much on these general assurances, because every year in which such a tax is imposed tends to weaken its abnormal character and to make submission to it as a regular feature of the Budget easier. He was particularly frank in admitting the unsettling effect of first reducing the tax from 80 to 40 per cent., and then putting it up to 60. The answer, however, to all the criticism of the tax and to the representations that it is damaging British trade is that the money must be found, and that no preferable alternative has yet been suggested.

It was on this ground that the House, much as it obviously dislikes the tax, voted for its increase to 60 per cent. For the present there is nothing to do but accept the inevitable. For the future, however, two lines of policy must be firmly followed, especially by the business community. First, there must be a remorseless stoppage of waste. Secondly, there must be no uncertainty as to the future of the tax. The pledge that next year it shall not exceed 40 per cent. must be regarded as irrevocable, and from that point on every interest concerned must combine to ensure its steady decline until it disappears altogether.

Synthesis of Ammonia at High Pressures

Some Notes on the Georges Claude Process

The recent acquisition by Cumberland Coal Power and Chemicals, Ltd., of the British rights in the process of M. Georges Claude for the synthetic production of ammonia gives a special interest, commercial as well as scientific, to the progress of the French operations at Montereau. Though a full disclosure of all the details of the French process is not made for obvious reasons, the following notes and illustrations give a general idea of the process and equipment.

WHEN M. Georges Claude, who was already the creator of the liquid air industry in France, set out to study the problem of the fixation of nitrogen from the air, his aim was to effect the necessary combination of nitrogen and hydrogen by the simplest possible apparatus of the smallest possible dimensions. The illustrations given in this article were recently taken at the works of the Chemical Society of the Grande Paroisse, near Montereau, where his process is now in operation, and they give some indication, with the descriptive matter, of the degree in which he has succeeded.

High Pressures

In one respect Claude has boldly departed from the lines followed by other investigators—namely, in the extremely high pressures employed in his process. Pressures as high as 2,000-3,000 atmospheres are successfully developed in gunnery work, but they are of extremely short duration.

Physicists, again, like Tammnan and Bridgman, have even realised pressures of 11,000, but only in connection with laboratory experiments and not in commercial practice. Generally, it may be said that up to the synthesis of ammonia the maximum pressure in ordinary use was about 30 atmospheres. While Haber employed about 200 atmospheres on a mixture of nitrogen and hydrogen brought up to a temperature of 500°-600°C. Claude's process compels the gases to react under a pressure of 1,000 atmospheres within the same limits of temperature. Since the German method proves that a pressure of 200 atmospheres suffices to secure practically the complete combination of the reacting gases, the employment of 1,000 atmospheres may at first sight appear to be purposeless. Claude's explanation is that under 200 atmospheres the combination of 80 to 90 per cent. of the reacting gases necessitates their repeated passage many times over the catalyser, followed by the recovery at each passage of the ammonia formed, since only about 10 to 12½ per cent. of the circulating gases is combined on each occasion. Under 1,000 atmospheres it was found that three passages sufficed to obtain a commercial yield. The volume of the catalysing apparatus for an equal production is effectively reduced far more than in inverse proportion to the pressures. The result of this simplification is a great saving in the cost of labour and of installation.

Some question has been raised as to the physical difficulty of compressing gases at these high pressures. Claude, however, claims to have demonstrated that in practice it is more profitable, as well as, in some ways, actually easier, to employ pressures of 1,000 atmospheres than pressures of 100 to 200. It is found that leather glands, for example, behave more efficiently the higher the pressure. With certain elementary precautions Claude has been able to construct with the ordinary piston rod compressors with which he is able to compress 100 cubic metres of gas per hour at a pressure of 1,000 atmospheres. The compression installation for 1,000 atmospheres does not differ materially from that for the lower compression to 200 atmospheres except for the addition of one or two small cylinders. According to the law of isothermic compression the work expended increases in proportion, not to the pressures, but to their logarithes, so that the power expended in obtaining pressures of 1,000 and 200 atmospheres is respectively in the ratio of 3 to 2. In other words, the 800 atmos-

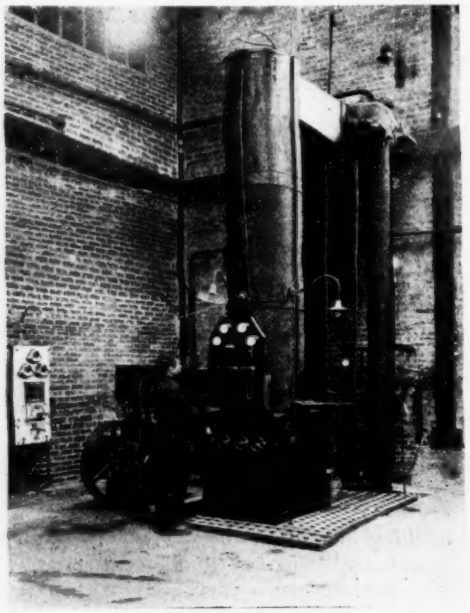


FIG. 1.

Claude Column for the production of nitrogen extracted from the air by liquefaction.

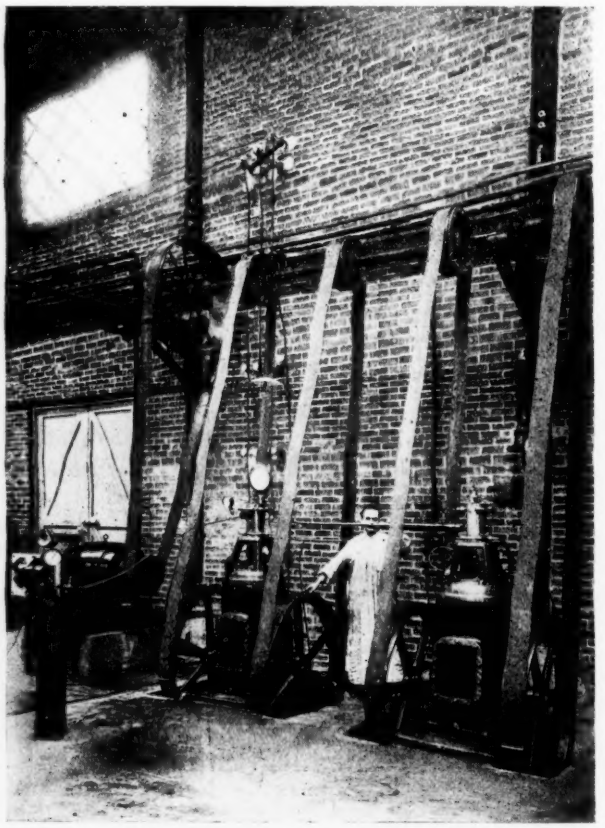


FIG. 2.

Two of the hyper compressors of the Montereau Works.

pheres which constitute the difference between 1,000 and 200 require for their realisation an expenditure of only half the power required to obtain the first 200 atmospheres pressure.

To apply such pressures the chief difficulty lies in keeping the joints tight. Whatever the pressure, the tightness of the joints must be perfect. At the Montereau works compressors with joints, connections and taps have been constructed, which are easily worked and absolutely tight, under a pressure of 1,000 atmospheres. Staunchness, it is stated, has been completely assured.

A New Metallic Alloy

Another important point has been solved. Some uncertainty was felt as to how, when in contact with so volatile a gas as hydrogen, the metal composing the enclosure in which it was necessary to confine it until combination with nitrogen took place would behave, in view of the modification of its molecular structure produced by both temperature and pressure. If doubt existed as to 200 atmospheres pressure with 600° C. temperature, such doubt would, it was held, doubly apply to the same temperature at a hyper-pressure of 1,000 atmospheres. It might have been thought that under such conditions the hydrogen would have found its way through any metal and thus rendered the process a failure, and there was the further danger of the combination of the hydrogen either with the metal of the walls of the container or with certain impurities in the metal, resulting in the formation of hydro-carbons, etc. Exhaustive experiments have been made to meet this danger. All the likely metals were tried, as well as lacquer or enamel surfaces, such as refractory linings of magnetite or dolomite, but for various reasons these substances were discarded. The trials, however, it is stated, have resulted in the discovery of a metallic alloy, from which walls absolutely staunch for hydrogen at the temperature and pressure named are obtained.

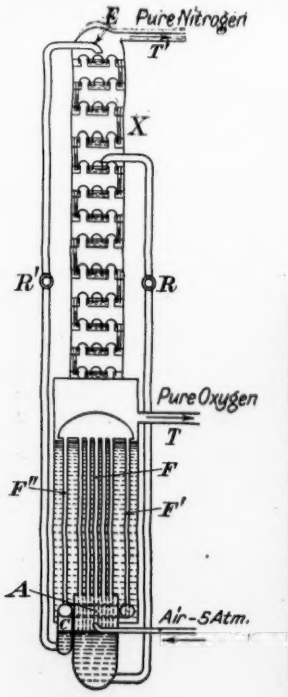


FIG. 3.

Diagrammatic section of the Claude Column for the production of Nitrogen by liquefaction. A. Admission of the compressed air. F, F' F'' bundle of pipes in which the oxygen and the nitrogen are liquefied. C.E. piping serving for raising the liquefied gases to the top of the apparatus X, distillation column. R, R' taps; T exit for pure oxygen. T' exit for pure nitrogen.

The Catalyser

Then there is the important question of the catalyser. In addition to the iron used by Haber and Van Oordt, uranium, osmium, tungsten, molybdenum and even magnesium (apart from the ease with which it takes up and gives up oxygen) have been found to be excellent catalysers. Metals such as tin, lead, zinc or bismuth are rejected because of their low points of fusion and the ease with which they are liquefied. The metalloids sulphur, phosphorus, arsenic, selenium, boron, &c., owing to their noxious properties, act as veritable poisons. On the other hand, in the condition of traces a quantity of impurities, viz., hydrates and oxides of the alkaline metals, are active promoters.

At Montereau a systematic investigation of catalysers, comprising promoters and poisons, has been and is being carried out in a concrete block divided into four compartments. Each of these holds a reaction tube containing, for a length of 10 centimetres and exactly at the point where the pyrometric couples indicate a constant temperature, a different catalyser. To these tubes are conducted by special branch pipes the mixture of gases under 1,000 atmospheres pressure. At the outlet of each compartment the gases are bubbled through sulphuric acid, which only allows the non-combined gases to escape. The volume of these is at once registered by the meters through which they pass.

The composition of the Claude catalyser is as yet a secret, but it is stated that it effects a combination of over 40 per cent. of the gases treated against under 12 per cent. only in the German process. Even better yields than this are still anticipated.

The Claude Process

Now as to the method by which the ammonia synthesis is carried out at the Grande Paroisse Works. The gases furnished in the proportions indicated by the equation $N_2 - 2H_3 = 2NH_3$ are compressed at first starting to 200 atmospheres and then to 1,000 atmospheres in two cylinders whose size appears to be insignificant in comparison with the final result.

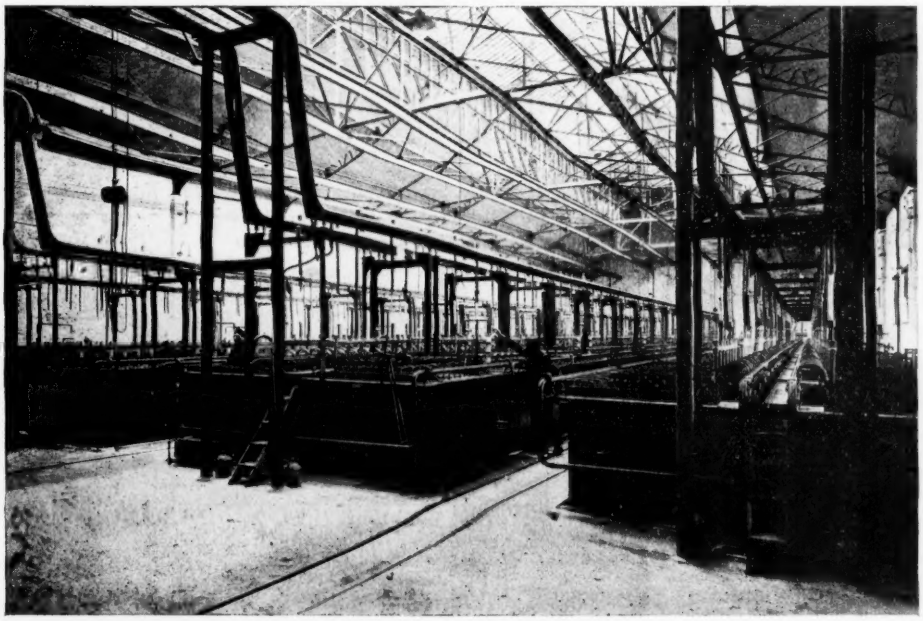


FIG. 4.

Electrolytic factory for the manufacture of hydrogen.

The nitrogen is extracted from the air by liquefaction in a column (Fig. 1). The working of this apparatus depends on the accumulation of the cold produced by a series of expansions of the compressed gas. Working differently from Linde, who produces the expansion of the air by allowing it to escape through a simple tap which produces only a slight lowering of temperature, Claude expands his compressed air and at the same time forces it to work the piston of an engine. By this expansion plus external work the gas is refrigerated to a much greater extent.

A compressor leads the air, which is previously dessicated at a pressure of 40 atmospheres, and the fluid formed is caused

after expansion to circulate round a bundle of tubes which composes the first liquefactor. Its expansion is completed in the cylinder of a second apparatus which brings about a further liquefaction.

To separate the oxygen from the nitrogen composing the liquid air thus produced their difference in boiling point (Fig. 3) is made use of. The compressed gaseous mixture is let into the distillation columns X in accordance with the practice for the rectification of alcohol. The oxygen condenses at the start, and the nitrogen is liquefied at the end. By emptying the latter at E, the summit of the apparatus, it is easy to withhold the oxygen from the issuing gases and the separation of the fluids is carried out with ease. Oxygen which is practically pure is collected through the pipe T while the nitrogen is removed through the pipe T'. The different portions of the column are enveloped in a thick layer of slag weel, which prevents the penetration of heat, and a casing of plate iron protects the whole. The necessary taps and cocks and pressure gauges complete the apparatus.

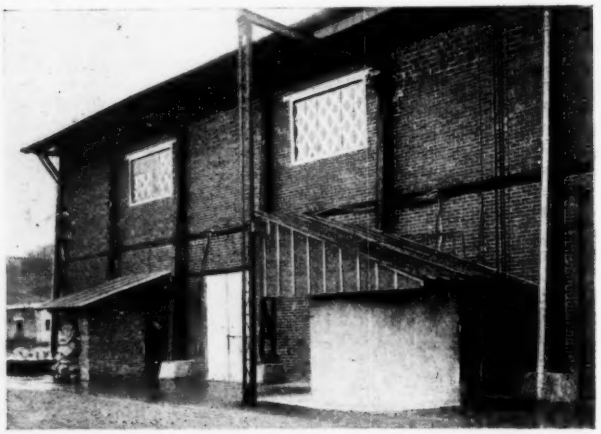


FIG. 5.

Reinforced concrete well situated outside the building in which the tubes containing the catalysers are isolated so as to avoid accidents in case of explosions.

On the other hand, the hydrogen is obtained electrolytically by one of the ordinary processes. (Fig. 4). At Montereau six Schneider electrical generators of 1,900 amperes each furnish a continuous current to 72 tanks in the electrolytic building. This being done, the gaseous mixture (nitrogen and hydrogen) is prepared beforehand, care being taken to free it from all traces of oxygen before passing it over the catalysers Then it is hyper-compressed to 1,000 atmospheres. Metallic pressure gauges measure this high pressure, which is maintained constant by regulating the admission at the hyper-compressor. (Fig. 2.) The small volume of gaseous yield is regulated by means of a needle valve placed at the head of the pipe, and the percentage of ammonia is determined by passing the issuing gases through a standard sulphuric acid solution and then through a gas meter.

So as to avoid the consequences of any adventitious explosion, the tube enclosing the catalyst in which the ammonia synthesis is accomplished is located in a reinforced concrete well placed outside the buildings. (Fig. 5.) Each catalyser tube is 2½ metres long, 2 centimetres thick, and has an internal diameter of 18 centimetres. Once started, the reaction continues without interruption. The high pressures, it is stated, are maintained in practice according to theory with ease. The apparatus does not permit any noxious vapours to escape into the air of the factory, the walls of the hyper-compressors are found to remain perfectly staunch, and pipes of minimum diameter suffice for the circulation of the equivalent of considerable volumes of gas. The liquefied ammonia is collected in steel flagons and more or less concentrated solutions of ammonia in glass vessels. (Fig. 6.)

Effect on Other Chemical Industries

Apart from the superiority of the yield and its simple and less expensive apparatus, the Claude process will, it is anticipated, have a marked effect on other branches of chemical industry. The manufacture of synthetic ammonia implies, in fact, the solution of the problem of the economical manufacture of hydrogen, since against 1 atom of cheap nitrogen it calls for 3 atoms of costly hydrogen, which is difficult to purify. Claude proposes to substitute for the present source of supply (viz., for the by-product of soda in the electrolysis of sea salt or water decomposed by red-hot iron) the gases of coke ovens which are hardly utilised at present. These contain 50 per cent. of hydrogen of low calorific value as compared with the 9,000 calories of methane with which it is mixed. If, therefore, the hydrogen in the coke oven gases were extracted, this waste would be avoided. After having removed from the gas its benzine, its ammonia and its toluene, Claude contemplates its complete purification by bubbling it through a suitable solvent.

This new synthesis will also permit of the modification of the manufacture of soda by the Solvay process through avoiding the use of the lime, which is totally wasted, together with the chloride, in the form of chloride of lime, the getting rid of which involves furthermore, a serious difficulty. Finally, the author counts upon transforming the ammonia into a product both convenient to transport and easy of application as a fertiliser. It is anticipated that for each ton of nitrogen fixed, three tons

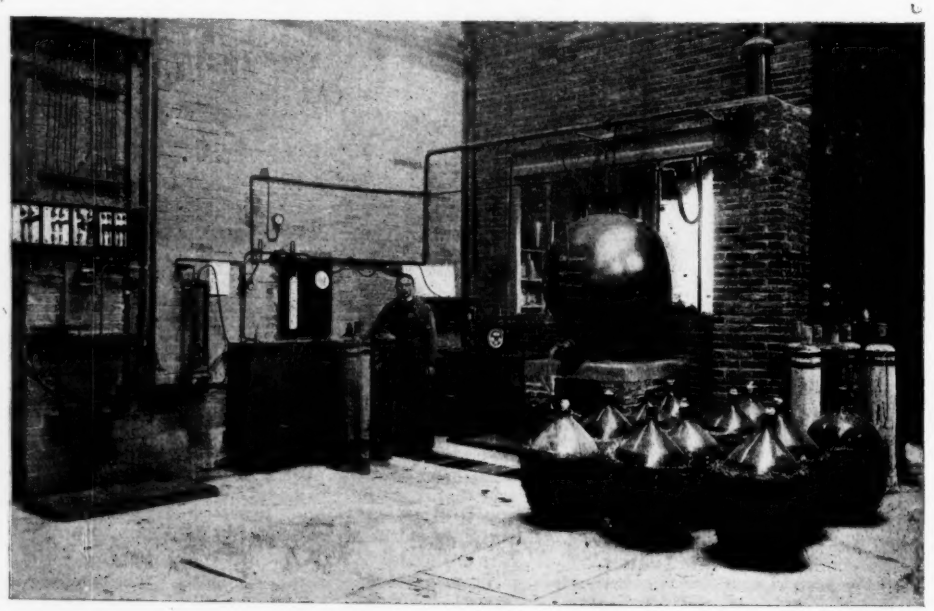


FIG. 6.

To the left installation for recovering liquid ammonia in steel tubes. To the right demijons in which the ammoniacal solutions are poured in more or less concentrated condition.

of carbonate of soda are obtained as a by-product, while large quantities of sulphuric acid are set free which would otherwise have to be used up to neutralise the ammoniacal solutions of the gas works where gas liquor is treated.

The above is a description of the semi-commercial unit installed at the works of the Ste. de la Grande Paroisse at Montereau at the end of last year, and which was visited early in January by a special committee of the French Academy of Sciences, and two days earlier by a party of well-known British commercial and scientific experts, all of whom were completely satisfied with the merits of Mr. Claude's process and its industrial prospects. It has recently been visited again by some of the above and by other eminent experts, who were equally satisfied. Since the visit of the former experts in January great progress has been made in the development of the process and in the installation of the full-sized commercial unit, which it is anticipated will be working before

FIG. 7.

Installation for the study of catalysts in the laboratory of the factory.

The concrete block is divided into four compartments each enclosing a catalyser tube. On the front are seen the gas meters which the gases pass through after being bubbled through flasks containing sulphuric acid which retains the ammonia and allows the uncombined nitrogen and hydrogen to pass.

the end of next month. We can state that it is the intention of Cumberland Coal Power & Chemicals, Ltd., to proceed with the installation of a large commercial plant in Cumberland as soon as the commercial unit in France is in successful operation.

Income Tax Reliefs

To the Editor of THE CHEMICAL AGE

SIR,—From the many inquiries which reach me by or on behalf of residents out of the United Kingdom, it would appear that many persons are unaware of the reliefs from British Income Tax which can be claimed in such cases. May I, therefore, set out as follows the various forms of relief :—

1. Residents abroad may obtain exemption in respect of dividends on foreign or colonial securities.

2. Residents abroad may claim relief in respect of all sources of income within the United Kingdom (such relief being dependent upon total income) if they are Crown servants, ex-Crown servants, widows of Crown servants, employees of missionary societies abroad, residents in Isle of Man or Channel Islands, or resident abroad for health. This relief is proposed to be extended to British subjects anywhere.

3. Exemption may be granted from dividends on certain British Government securities issued with the condition that they shall not be chargeable to tax if the beneficial owner is ordinarily resident out of the United Kingdom..—Yours, &c.,

67-68, Cheapside, London, E.C. 2. W. R. FAIRBROTHER.

Sulphate of Ammonia and Free Acid

To the Editor of THE CHEMICAL AGE

SIR,—Your editorial comments, in this week's issue, on my recent communication on moisture and sulphate of ammonia convey a quite erroneous impression of the trend of my remarks on the effect of free acid. I did *not* state that "free acid in the sulphate does not tend to attract moisture." I know of course, as every chemist knows, that sulphuric acid is naturally arid of moisture—hence its employment as a desic cating agent. What I *did* state, and proved experimentally, was that sulphate of ammonia, whether containing free acid or quite free from that deleterious ingredients, absorbs moisture in a damp atmosphere and gives it up in a dry one.

Then I was not dealing with sulphate containing "proportions of free acid ranging from 1 to 1½ per cent." Such qualities of salt are quite abnormal, and there would have been no profit in considering them. I was concerned with such qualities of salt as are normally met with, namely, containing free acid in proportions from ·5 per cent. downwards.

Further, I am a strong advocate of the elimination of all such acid, and for that purpose have, as is well known, designed a simple and inexpensive process. (Patent No. 124,946.) It would therefore have been strange had I not been fully alive to the evil effects of acid in sulphate to which you draw attention.—Yours, &c.,

Birley Carr, Sheffield, July 10. JOHN T. SHEARD.

To the Editor of THE CHEMICAL AGE

SIR,—Referring to Mr. Sheard's recent communication to you under the above heading. At Stafford during the past two years we have been making neutral *dry* s/ammonia by the South Metropolitan process, and our experience of the stored s/ammonia does not confirm Mr. Sheard's conclusions.

On careful consideration we are under the impression that Mr. Sheard has studied the question in an incomplete way, as all his experiments are on small samples in thin layers, whereas the behaviour of s/ammonia when laid out in thin layers and stored in bulk is very different.

We agree that s/ammonia, whether neutralised or not, will, if exposed to varying degrees of humidity, contain from time to time varying quantities of water, and this is especially the case when spread out in thin layers, but there is a great difference in the hardness of the caking effect of (*a*) acid sulphate of ammonia, (*b*) ordinary neutral sulphate of ammonia, (*c*) neutral dry sulphate of ammonia, especially as to the depth of the caking of the surface or crust in the heap.

We find that the s/ammonia made with the South Metropolitan process (which is not simple neutralisation alone, but consists of neutralisation and drying by a special method in one operation, the resulting s/ammonia being of a constant fine bluish grey colour), when stored in a heap, does, after some days, cake on the surface from ½ in. to 1½ in. deep, but the remainder of the heap is apparently protected and remains unaltered in physical condition ; and even the caked s/ammonia on the surface *crumbles easily in the fingers*, although it may contain a relatively high percentage of moisture, but this is quite different from the very hard caking effect which takes place with ordinary acid s/ammonia.

Mr. Sheard's conclusions might lead those who have no experience of neutral sulphate to believe neutralisation to be unnecessary, but we have a large amount of testimony from *farmers* and others who have used the new s/ammonia that it is much more satisfactory to apply and use ; in fact, recently when owing to a breakdown we had for a few days to revert to acid s/ammonia, we found it impossible to dispose of it to local farmers, and, therefore, had to send it out of the district.

We have neutral dry s/ammonia which has been in single twill bags for from six to 12 months ; there is no deterioration of bags, and no outward sign of moisture, and if one of these bags is turned out it is found not to have caked, although it may adhere where it has been on the surface of the bags, but this is *easily* crushed by the fingers, which is a very different thing from acid s/ammonia, which would require a mallet to break it up.—Yours, &c.,

Corporation Gas Works, Stafford, July 8. W. M. VALON. (Engineer and Manager.)

Society of Chemical Industry

Annual Meeting at Newcastle: Papers and Discussions

The 39th annual meeting of the Society of Chemical Industry was opened in the Chemical Lecture Theatre, Armstrong College, Newcastle-on-Tyne, on Tuesday last.

Welcome by the Lord Mayor

Before the usual business of the meeting took place, the Lord Mayor of Newcastle, Mr. Walter Lee, welcomed the members of the Society to Newcastle. He assured them that the citizens of Newcastle quite appreciated the importance of the industry which was represented by the Society. He hoped that from the scientific, practical, and social side that the Conference would be a great success. Now that the war was over they looked to the scientific men to take a great part in the reconstruction. There was a feeling that we had got over the big "boom" now, and there would be the question of finding employment for our workmen, and he believed that science and research work would go far towards providing that. It was a privilege and pleasure to extend a civic welcome to the Society.

Sir Theodore Morison, Principal of Armstrong College, said it gave him great pleasure to welcome the Society to Armstrong College, and he was very pleased they had chosen that place for their meeting. The association of the universities with industry was one of the outstanding facts at the present time. A glance at the papers of the day proved conclusively that industry was becoming alive to the importance of education—of university education. While that was true, there was another point not sufficiently emphasised, and that was that the universities were beginning to realise the importance of industry. It was true that at one time the universities held themselves aloof from the practical side of life. Particularly was it due to the chemical faculty that the aloofness was broken down, and now every faculty was contributing something towards industrial progress. Even the faculty of philosophy, which had formerly held its head highest in the clouds, was beginning to discover that one of its branches (psychology) might be of great use to industry. The fact that the Society had selected the College for their meetings afforded him the liveliest satisfaction.

Professor Sir W. J. Pope
(The New President)

Prof. Louis, in thanking the Lord Mayor and the Principal for their joint welcome, said that the twofold welcome from the civic and academic authorities of the metropolis of the north of England was one that peculiarly befitted the objects of the Society, a Society whose principal object had always been to foster the applications of science to industry. He saw in it something more than the traditional hospitality of the north of England; he hailed it as the development of a new era which would make for the continued prosperity of Tyneside. He thought he was right in saying that local industries had never until recent years fully appreciated the benefits they could derive from a more intimate contact with science. North country manufacturers had not availed themselves as they might have done of the resources of scientific technology. There were many reasons for that, and one was the excellence of the Tyneside working man. It was due to his excellence that the rule of thumb had lasted longer than in other districts. He could give a long list of Tyneside firms which a few years ago took little heed of the sciences, but to-day had splendidly equipped laboratories which they regarded as the best investment they had ever made. The fact that the Lord Mayor and the Principal of the local university had combined to welcome their Society to Newcastle was evidence that the importance of the principles and objects of the Society were appreciated. He thanked them for the hearty welcome on behalf of the Society.

After the Lord Mayor and the Principal of Armstrong College had acknowledged the thanks of Prof. Louis the ordinary business of the meeting was proceeded with.

Dr. G. Weyman and Mr. A. Shortt, of Newcastle, were appointed scrutineers, and at a later stage of the proceedings they announced the result of the ballot for members of the Council as follows: Dr. T. Howard Butler, Mr. W. H. Coleman, Mr. F. H. Carr and Dr. F. C. Garrett.

Report of the Council

The Council in their report for the past year state that the number of members on the register is now 5,571, as compared with 5,236 last year. Since the last annual meeting 532 members have been elected, 55 former members have been restored to membership, and the losses have been 252. The Council regrets to record the deaths of 41 members (of whom 13 were original members). It expresses its cordial thanks to the retiring officers for their services to the Society, and has conveyed to the relatives of the late Dr. Messel and of the late Mr. Watson Smith its high appreciation of the valuable work done by them respectively. The President during his year of office has visited the following local sections of the society and held informal meetings with the committees: Birmingham, Edinburgh, Glasgow, London, Newcastle, and Yorkshire. He has also met the committee of the Chemical Engineering Group. On each occasion he was accompanied by the general secretary. The Council is very pleased to know that these visits have given much satisfaction to the local committees, and feels sure they will be productive of great benefit to the society.

A cordial invitation has been received from the Canadian Section to hold the annual meeting for 1921 in Montreal, and the Council recommends its acceptance.

It was decided in November that for the further period of twelve months no enemy aliens should be admitted to membership of the society.

The committee of the London Section has promised to give a donation of 200 guineas to the society out of funds remaining over from the annual general meeting last year. The Council much appreciates this generous gift.

A scheme drawn up by the President, Mr. John Gray, for the setting up of a number of standing committees has been adopted with the object of facilitating the work of the Council and of providing an appropriate series of committees to which matters requiring special consideration can be at once remitted.

Prolonged and serious consideration has been given to the financial position of the society. The income and expenditure accounts for the years 1918 and 1919 show deficiencies of £3,145 and £2,353 respectively. In order to wipe off the former, several of the society's investments had to be realised, and a similar course will have to be adopted for the purpose of clearing off the latter. The deficiencies have been due to the enormous increase in the cost of printing and paper, and the Council, realising the seriousness of encroaching further on the society's reserve funds, has, after much deliberation, decided that the annual subscription must be increased from January 1 next. A resolution regarding this will be placed before the meeting. To provide for the case of young persons applying

for membership a scheme has been devised under which such persons will be admitted at a lower subscription than that payable by ordinary members.

It is gratifying to know that members of the society are taking advantage of the facilities offered them by the Chemical Society for using its library and borrowing books from it. The Council has renewed for 1920 its donation towards the expenses incurred in connection with the Chemical Society's library extension scheme.

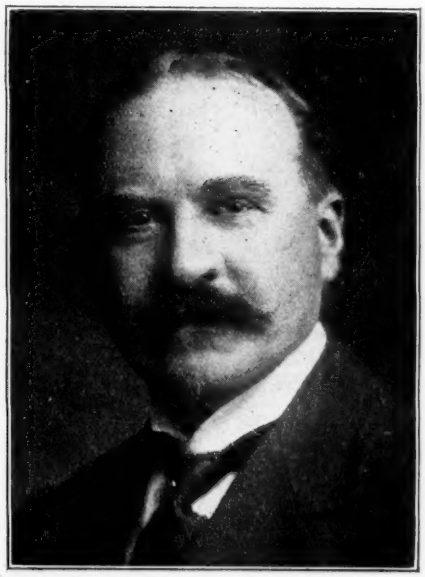
The London Section appointed a committee, of which Professor J. C. Philip was chairman, to report on the steps which should be taken in order to standardise the application of the refractometer to industrial and scientific purposes.

The Council has received from the Chemical Engineering Group of the society a resolution requesting it to take up consideration of standardisation on a wide and comprehensive basis in connection with apparatus and materials in the chemical industry to which standardisation can properly be applied. The Council considers that this subject is one of great importance, and it is securing the co-operation of the Association of British Chemical Manufacturers and of the British Engineering Standards Association in dealing with it.

In the interests of the members of the society who are chemical engineers the Council has taken an active interest in opposing the Civil Engineers (Registration) Bill promoted by the Institution of Civil Engineers. Having regard to the admitted impossibility of the Bill passing in the present session of Parliament, it has been decided to take no further action at present.

The draft rules of the Federal Council for Pure and Applied Chemistry provide that the constituent bodies shall contribute to the expenses of the Federal Council (including the agreed contribution to the International Union of Pure and Applied Chemistry) on a membership basis. The society's contribution will be £100 per annum, and this has been agreed to.

The Imperial Mineral Resources Bureau submitted a scheme to establish a complete system of abstracting publications dealing with the entire subject of mineral products, and suggested that a committee should be formed to consider the best means for carrying this into effect; it was also their intention to set up other committees which should direct their attention to special subjects and classes of mineral products. The Council on the invitation of the Bureau nominated two representatives to the "Abstracts" Committee and one representative to each of certain other committees.



Mr. JOHN GRAY,
(Retiring President.)

A communication was received from the University of London, requesting the Council to suggest names of members to form a committee representative of the chemical trades to examine its scheme for degrees in commerce. It was considered desirable that such a committee should comprise representatives both of the society and of the Association of British Chemical Manufacturers, and this suggestion was approved by the university authorities.

Mr. W. F. Reid was appointed the society's representative on the Committee of the Department of Import Restrictions. The work of the committee has since been taken over by the permanent officials of the Board.

A communication was received from the President of the American Chemical Society, inviting the council to appoint a Committee on Nomenclature, Spelling and Pronunciation to co-operate with the corresponding committee of the American Society. Professor G. T. Morgan, Mr. T. F. Burton and Dr. E. H. Tripp were appointed such a committee, to co-operate with the similar committee of the Chemical Society of London.

Consideration has been given to a communication from the Conjoint Board of Scientific Societies pointing out the serious handicap from which the nation suffered in the early years of the war in respect to the application of science to war problems and the desirability of approaching the Admiralty and War Office with the object of establishing a more satisfactory and permanent basis for the application of science to the problems concerned in view of future wars. The Board regards it as essential that continuous research by co-operation between the Services and individuals engaged in scientific research should be established with a view to the application as soon as possible of new discoveries and principles to war problems, and that facilities for the mobilisation of a scientific staff without delay and in the most efficient manner should be provided. The Council is fully in accord with the views and proposals of the Board, and has submitted certain suggestions bearing on the scheme.

A communication was received from the National Union of Scientific Workers regarding the question of making representations to the Lords of the Treasury for the purpose of obtaining concessions in respect of the assessment for income tax of scientific workers, along with a suggested form of petition, and the Council has expressed its sympathy with the proposals submitted.

The Chairman formally moved, and Dr. J. T. Dunn seconded, the adoption of the Council's report.

The Financial Report

Mr. D. Lloyd Howard, the retiring treasurer, in submitting the balance-sheet, referred at length to the adverse balance, and said, though the position was undoubtedly serious, he did not think it was desperate. He hoped that when the resolution came before them regarding the increased subscriptions that they would support the recommendations of the Council. He felt that a personal explanation was needed regarding his retirement. It might be thought that his retirement indicated a disagreement with the policy of the Finance Committee, but he wished to emphasise that nothing had occurred in the deliberations of that Committee with which he was not in full agreement. In fact, he thought the members should know how greatly they were indebted to that Committee for the efficiency of the Society. He had received the most loyal support of his colleagues during his term of office, and he resigned with regret. He formally moved the adoption of the financial report.

References to the "Chemical Age"

Mr. E. V. Evans, the hon. treasurer-elect, spoke at length on the need for increasing the expenditure, and particularly on the need for maintaining the efficiency of the *Journal of the Society*. Some critics of the *Journal* had suggested that contemporary journals provided the information which they read in the *Journal of the Society*. He assured them that such immaculate care was taken in the production of the *Journal* that that could not be the case. He sometimes thought the Society was too lenient in the matter of giving information to contemporary journals—information which really belonged to the Society. One journal claimed the Society as its own, and headed an editorial as "Our President." (Laughter.) However, he could say that that journal had said some very nice things about the Society, and he was glad to thank them publicly for what they had done. He concluded by seconding the adoption of the financial report.

The report was adopted.

A vote of thanks to Mr. Howard for his services as treasurer was heartily accorded.

Increased Subscriptions

The Chairman said the next part of the business was, perhaps, the most important—the proposal to raise the subscriptions. The position was very simply put by saying that

they were spending more than they were getting in. Despite that, the Society was in a flourishing condition so far as growth of membership was concerned. That unbusinesslike state of affairs could not go on. He moved the following resolution :—

1. That the annual subscription payable by members be £2 10s. from January 1, 1921.

2. That the Life Composition Fees be increased from £30 and £25 to £40 and £35 respectively.

3. That a member joining under the age of 25 shall be entitled to pay a subscription of £2 per annum until attaining the age of 25, or for three years from the date of election, whichever is the longer period ; but subject to the provisions that his application for membership must be accompanied by (1) satisfactory evidence of age, and (2) a declaration that he is not joining the Society as a nominee of any firm or corporation, but solely in his own interests as an individual member.

Dr. E. H. Armstrong seconded the resolution.

Mr. Goodwin (Canada) remarked that he thought a reduced price for the *Journal* in Canada would result in many new members out there. His own students were hesitating between the *American Society Journals* and the *Journal of the Society*.

Prof. Louis pointed out that if they charged the Canadian members the net cost of the *Journal* they would be out of pocket. The main expenses ought to be borne by the Canadian members as well as members at home. He agreed that any suggestion made by the Canadian section should receive the careful consideration of the Council. The new bye-laws would give them certain powers to regulate and modify the subscription in certain circumstances.

The resolution was unanimously carried.

Prof. Louis moved the amendments to certain bye-laws, the principle effect of which was to create better rules for subject groups, to make porvision for the election of a Council Chairman in addition to the President, and to allow proxy voting at general meetings.

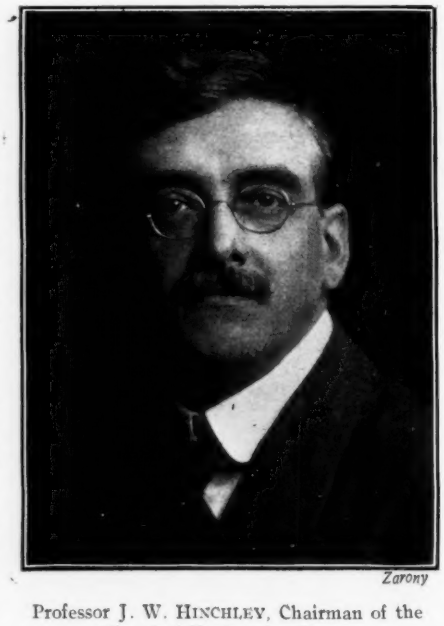
Dr. Stephen Miall seconded, and the alterations to the bye-laws were unanimously agreed to.

Presentation to M. Paul Kestner

The next item on the agenda was the presentation of the Society's gold medal to M. Paul Kestner. When Prof. Louis called upon M. Kestner there was a splendid receiption given him by the gathering.

Professor Louis said that none of the duties devolving upon him afforded greater pleasure than to present the Gold Medal of the Society to M. Paul Kestner. The society had honoured itself in honouring him. M. Kestner's work had lain in that difficult branch of the science which they were learning to call chemical engineering, and he hoped the award of the medal would be taken to indicate the importance the society attached to that particular branch of the work. Professor Louis briefly recounted some of the better known works of M. Kestner, and alluded to the success which had crowned his efforts in establishing the Chemical Society of France. In conclusion, he added that he hoped the chemists of both the French and British nation would recognise in the homage paid to M. Kestner the earnest desire of both to continue in the times of peace the close and cordial co-operation that led them through the bitter stress of war to its ultimate triumphant issue. (Applause.)

M. Paul Kestner said that in granting the medal of the Society to a foreigner the society had not altogether departed from its traditions. Not only was the recipient an old member of the Society of Chemical Industry, but also a very great and old friend of Great Britain. He had always been a fervent admirer of Great Britain, and he was fully certain that he owed what success he had attained to the learning obtained in an intimate connection for over 30 years with this country and its methods. Truly, he had sat at the feet of the British men of science, and he felt he was one of their pupils. He felt he should drop all conventional attempts to express his gratitude, and his emotion was such that he felt like using heart to heart language in thanks. The honour was totally unexpected, and in all sincerity he felt it was the crowning point of his career. He fully realised that the true purpose of the society's choice was to honour his country. They had celebrated in his modest person a delicate allusion to the everlasting alliance of Great Britain and France. He also realised that it was an honour to his colleagues of the Société de Chimie Industrielle. It was especially gratifying to him that the medal should be handed to him by his old friend Professor Henry Louis. He was a distinguished past president of the society, and the "War President" of the society. Under him the society had achieved some great work during the war, and he would say to Professor Louis, "Vous-avez bien merité de la Société." He concluded by again thanking them for the honour they had done him, and through him the French Chemical Society.



Professor J. W. HINCHLEY, Chairman of the Chemical Engineering Group.

Next Year's Meeting in Montreal

Professor Louis read the invitation of the Canadian Section to hold the next annual meeting in Montreal, and formally moved the acceptance.

Mr. H. M. Ridge seconded in a few well-chosen remarks regarding the natural mineral resources of Canada, which provided such a wide field for industrial chemistry.

The invitation on being put to the meeting was unanimously accepted.

Professor Louis then referred to the absence of the President, and received the unanimous vote of the conference that a message of sympathy be sent him, with a hope that he would speedily recover.

Professor Louis explained that the presidential address had not been revised, but Mr. Gray was quite willing that it be read as it was to the Conference, providing that publication be delayed until a later date.

Presidential Address

Professor Louis then read the address. The address dealt chiefly with industrial organisation, particularly as applied to the chemical industry. It dealt with the various methods of obtaining the maximum output, the need for care in selecting raw materials and the elimination of waste. In the latter respect he urged the development of mutual confidence between employer and employed, the selection of suitable employes, the prevention of accidents, the avoidance of fatigue, and the provision of organised recreation for workers.

Sir W. J. Pope

Sir W. J. Pope (the president elect), in moving that the president be thanked for his address, said that he hoped it would soon be available for a wider audience than present at the meeting. The subject of chemical technology had never loomed so large than during the past six or seven years. The reason was two-fold. In the first place the war had taught the whole world that the possession of a flourishing chemical industry was essential to the life and progress of modern nations. Secondly, the increased manufacture of chemical products during the war period had taught everyone that the country was capable of developing its own chemical industry in such a manner as to be entirely independent of foreign production. That result had been obtained by the work of men like their president, a man who by the exacting nature of his work did not come much before the public.

Mr. Walter Reid seconded that a vote of thanks be accorded the president, and this was agreed to.

The re-election of Messrs. Price, Waterhouse as auditors concluded the business of the morning session, after which the members were entertained to luncheon in the King's Hall of the College.

Conference on By-Product Coking

THE first session of the Conference was held in the afternoon in the Chemical Lecture Theatre, Armstrong College. The general subject for discussion was by-product coking.

Professor P. P. Bedson (Armstrong College), who presided, said the papers they were to have read that afternoon referred to the coking and by-product industry. It was impossible to over-exaggerate the importance of the complete utilisation of coal—an importance which, during the past few years, had been brought home to the general public as well as to the chemists and scientists by a method he had advocated years ago—a rise in the price of coal. He always felt a certain

Professor HENRY LOUIS
(Acting President in the absence of Mr. John. Gray).

amount of regret when dealing with the subject of the recovery of by-products. He gladly recognised the great progress the industry had made during the past few years, but, withal, it was a matter of regret that it had taken this country so long to appreciate and make headway in the practice of coking coal, especially with the recovery of by-products, and particularly when they considered that forty or fifty years ago there were advocates who pointed out the benefits of the practice. That we should have allowed others to pioneer the industry was not a thing to be proud of. Despite our achievements one was filled with regret when thinking of the time wasted. Of the factors which had contributed to the backward condition of the British by-product coking industry the first was that in this country, and particularly in the neighbouring county, such a good supply of excellent coking coal was available that the practice of coking had not received much attention, Nature having provided such excellent raw material. The second factor had been the experience of iron-masters that a slightly larger amount of retort oven coke was needed to make iron than of bee-hive coke and that fact, supported by the dictum of Sir Lothian Bell, had deterred many from embarking on the recovery of by-products when coking coal. As he had said, they had made great progress in the last 15 or 20 years in the industry, and they had not only been able to equal the German methods, but also, in the County of Durham at least, they had been able to improve in many ways on the processes. They could also apply their own raw materials to the construction of the ovens.

By-Products from Coke Ovens

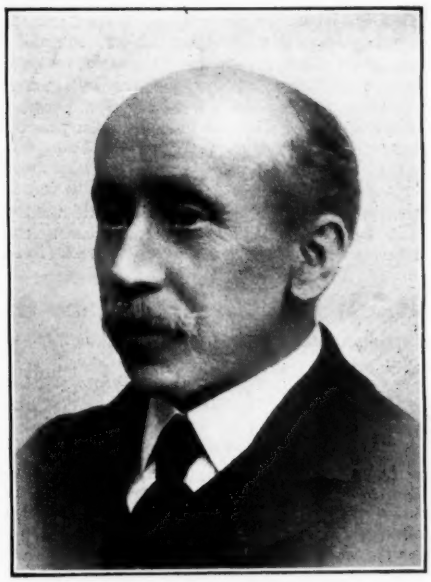
THE first paper of the session was read by Dr. E. W. Smith, who traced the gradual elimination of the bee-hive oven by the adoption of the by-product oven, and suggested that the bee-hive type would disappear completely as soon as the methods adopted in by-product practice were such as to provide a coke having the necessary physical characteristics of bee-hive coke for the particular industrial requirements, and when some of the present users of bee-hive coke realised that not all the characteristics of bee-hive coke were essential to their particular operation. He was quite sure that a great deal of uncalled for prejudice existed amongst furnacemen in favour of bee-hive coke, and he was sure that by-product coke could be made which when properly used would give equal results with bee-hive coke. Dr. Smith was of opinion that the present methods of steam raising at coke ovens with gas in Lancashire boilers was wasteful, and that the gas might be put to more profitable use, and the steam raised by cheaper means. On the question of gas as a by-product he was convinced that when large extensions of ovens were contemplated, and where there was an outlet for the gas produced to boost up the town supply, the question of heating ovens by means of externally produced by-product recovery producer gas should be fully considered with a view to releasing for town use not just 40 per cent. of the make of gas, but the whole of it. He concluded a lengthy paper by a reference to the work of Mr. Ernest Bury and the extraction of alcohol, saying that the process showed great promise.

Discussion

Mr. H. E. Wright said that Dr. Smith had spoken of 40 per cent. surplus gas in the coke ovens. In the newer regenerating types it was more like 50 to 55 per cent.

Mr. D. R. Wattleworth asked what was the best process for the production of neutral sulphate?

Mr. A. E. F. Knott did not quite agree that the difference of yield in the by-product oven as compared with bee-hive ovens was 10 per cent. He thought half that was more like the average figure. Regarding the temperature for working, the temperatures given by Dr. Smith appeared more like the American way of working. There was no doubt that there were many good features in that method, but he did not think it could be adopted in England at that temperature without rebuilding with a class of silica bricks which would stand a



Professor P. PHILLIPS BEDSON
(Charman of the Local Committee).

heat greater than any they obtained in England. Then there were the abrasions of the rams to be considered. Regarding neutral sulphate, he did not think it would be developed until the price compared more favourably with the cost of production.

Mr. E. E. Wood said that the question of using patent oven coke in blast furnaces as compared with bee-hive coke had been carefully considered at the works at which he was engaged. They found that any coke which could stand in the ordinary cupola would stand in the blast furnace, and they had found it more difficult to get a good

cupola coke out of patent ovens than a good blast furnace coke. They had found they got better coke the cooler the temperature.

Mr. S. A. Wickner said that greater attention should be paid to keeping ammonia chloride out of tar. He had had some nasty fires from that cause, and he certainly thought the matter was worth careful attention.

Mr. W. Diamond said that Dr. Smith's statement that the greater part of gas used for heating boilers might be better utilised might have applied some years ago, but there were sufficient efficient burners on the market now which would burn it quite efficiently in the boilers. They had made calculations some time ago, and found they were working at 9d. per thousand. He agreed that crude methods existed, and gas might be economised much more than at present, and congratulated the author on the paper.

The Author's Reply

Dr. Smith, replying, said that the question as to what was the best process for making neutral sulphate could be put to any qualified chemist, and he would answer it. It did not need to cost much or cost much for drying. It was possible to do it in a number of quite cheap ways, and any one of several ways was excellent. The method adopted by the South Metropolitan Gas Co. was one of the best and cheapest. Regarding the high temperatures of ovens, and the possibility of getting satisfactory bricks in this country, much of his experience was from the Saltley gas works at Birmingham, where the ovens were kept at the high temperatures he named. There was not much fear of the cracking of the hydro-carbons passing through the heated chamber at the top of the oven. At low temperatures benzol was not produced in such great quantities as at high temperatures. The amount produced compared very favourably with the best horizontal practice. That indicated that high temperatures were not a deterrent. They used English bricks; he believed they were Leeds silica bricks, and the life of the ovens was quite satisfactory. Despite Mr. Diamond's figure of 9d. per 1,000, he thought that if 1s. 6d. could be obtained for town supply it was wasteful to use it on boilers. He was sure that a great number of the boilers he had seen were burning gas in an inefficient way. A single pipe into a Lancashire boiler was not an efficient way of burning gas in a boiler.

Papers were then read by Mr. Rees and Mr. Ward, without discussion.

Corrosion of Coke-Oven Walls

Mr. Rees, in the course of his paper, said that the characteristics of the ordinary type of silica brick which rendered it unreliable for coke oven use were its continued growth during use, its rather high porosity and its tendency to spall from the repeated changes in temperature. It was now possible by combining the two factors of suitable grading and adequate burning to produce a silica brick with physical properties such as should make its successful use in coke oven practice a distinct possibility. Such bricks were already being made, and were being put into places where corrosion had been severe. American experience had shown that at coking temperatures, the conductivity of good silica bricks was decidedly greater than that of fire clay bricks or semi-silica bricks. That should be a further point in the use of silica bricks in coke oven construction.

Coke-Oven and Blast Furnace Gases

More Economical Uses for Heating and Power

The object of the paper on this subject prepared by G. W. Hewson, A.I.Mech.E., and S. H. Fowles, A.M.I.Mech.E., was to show that coke, after leaving the oven, produces large quantities of gas which can be more efficiently utilised than is the practice at present. Blast-furnace gas alone, it was agreed, should be used for gas engines in the power house, and the surplus coke-oven gas would be better employed in heating steel furnaces and soaking pits, either alone or diluted with blast-furnace gas. Open-hearth steel furnaces have been successfully operated with coke-oven gas, thus effecting a considerable saving against producer gas. Other advantages are that coke-oven gas is anhydrous and low in sulphur, and it is possible to provide a reducing atmosphere over the bath, which is a decided advantage in the production of high-grade steel for preventing excessive oxidation and decarbonisation. Coke-oven gas does not require pre-heating; it suffers decomposition, and its calorific value is reduced by 25–33 per cent. if pre-heated in the gas chambers of an open-hearth furnace. The manganese consumption is lower throughout than when working with producer gas. In addition, a saving is effected in refractory bricks, in wages and in steam. On the basis of 8,000 cubic ft. of coke-oven gas required for making 1 ton of steel and 4,300 cubic ft. for re-heating furnaces per ton of steel, the quantity of coke-oven gas potentially available is sufficient for about 8 million tons of steel per annum. The purpose for which surplus coke-oven gas is actually used is largely dependent upon the location of the ovens. The demand for such gas may be sufficiently great in some instances to make the gas a more important product than the coke. In such cases the plant would actually be a by-product gas plant.

The relative proportion of blast-furnace gas made and utilised profitably in Germany and this country in 1911 was :—

	Germany. B.H.P.	England. B.H.P.
Producible	1,340,000	1,060,000
Utilised	448,000	23,000

In 1911 the total power production from blast-furnace gas was : America, 32·5; France, 5·4; Belgium, 4·6; Austria-B.H.P., of which Germany contributed 46·5 per cent.; America 32·5; France 5·4; Belgium 4·6; Austria-Hungary 2·4; Great Britain 2·4; and other countries 6·2 per cent. The authors suggested that, from a national standpoint, it would be better to harness all the potential power of the 300 blast furnaces at work in this country, and, linking up with existing power companies, supply the country with a large proportion of its requirements at a more reasonable rate than is at present possible with stations using coal-fired boilers and turbines. It has been stated recently on high authority that if the steam turbine be increased from what is considered a reasonable size to-day—viz., 15,000 H.P. up to 60,000 or 70,000 H.P.—the steam consumption can only be reduced ½ lb. per kilowatt generated, which is a very small amount compared with the increased size of unit. This large size of unit has another great disadvantage, that with a station of two such units when one set fails serious inconvenience will be caused, even allowing for the possibility that such a plant may be linked with the greater scheme. Again, some of these larger stations may be built at a distance from the coalfield, and this will not mitigate our transport difficulties. Apart from cost of running, the reciprocating gas engine is more in favour as a blast engine than the turbo-blower from the blast furnace view-point.

The authors' conclusions were that by building coke ovens near the blast furnaces and steel works upon the regenerative principle, about half the gas generated can be utilised for the latter. Further surplus gas might be released if the ovens were fired with gas produced from inferior fuel, unsuited for other purposes than conversion into producer gas. With cleaned blast-furnace gas better results are obtained on the furnaces themselves, as the result of higher and more regular heats being obtained upon the stoves. More regular blowing is possible with gas-driven engines than with the old steam engines. By means of clean gas the requirements of the blast-furnace plant can be easily met, and surplus gas is available for other purposes, preferably for the generation of electricity by gas engines, and thus supply all the power required by a modern iron and steel plant. The production of electric steel, or the finishing of steel manufacture in an electric furnace, is gaining favour in America, and it appears to the authors that the policy they have advocated may lead to an impetus being given in this country to the finishing of steel manufacture in an electric furnace, which, as a piece of apparatus for refining steel, has no competitor.

Coke-Oven Gas for Town Supply

In Mr. H. E. Wright's paper on this subject, it was pointed out that if the true economy of our fuel resources is the main consideration, then the regenerative type of metallurgical coke oven stands first as a means for producing town gas with the least waste of the original fuel. In round numbers, the relative efficiency of the various methods expressed in percentage heat units of original fuel remaining available in the final product is : (1) Regenerative coke oven, 90 per cent.; (2) average gasworks' plant, 85 per cent.; (3) average gas plant afterwards converting all surplus coke to water gas, 55 per cent.; (4) water-gas plant, 49 per cent. The steaming of retorts and the making of water-gas are directly opposed to the conservation of fuel. This procedure is also only made financially practicable if town gas is sold at prices very much exceeding its true fuel value. The cost of distribution and general charges which can be reduced *pro rata* by increased sales is one of the chief items in a gasworks' cost account. The true reason that gas is not more largely used for heating and cooking

by the public to replace coal and coke is because the latter means is less costly, and if the economic policy of gas manufacturers were directed to providing gas at a cost nearer its heating value they would by thus encouraging consumption reduce one of their principal costs.

This is a strong argument in favour of the use of the regenerative coke oven for manufacturing gas for town supply, where it is possible to adopt it, because in a proper economic situation it can supply gas for town use at a price very little in excess of the cost of distribution and general charges. On the other hand, it is unfortunate that it may only be economically sound to adopt this method at a limited number of places. In the regenerative coke-oven the surplus heat from the combustion of part of the gas to carbonise the coal is retained by reversible regenerators, and this being carried back to the oven walls by the air supplied for combustion releases all surplus heat as surplus gas. The actual gas realised varies with the quantity of coal used. In the average case the surplus would be 55 per cent., or about 6,000 cubic ft. per ton of coal. By proper construction of ovens and regenerators to enable producer gas to replace the gas used in heating the ovens, all the coke-oven gas could be obtained as surplus, but there is no saving of thermal units in this procedure—rather the reverse. Therefore, unless the gas so liberated can be sold at a higher price than the cost of the producer gas required to liberate it, this proposition is economically unsound, and from the point of fuel conservation it is totally unsound.

Successful coke-oven undertakings derive their revenue from the sale of metallurgical coke, and only in areas where such fuel can be sold readily can they succeed. The coke oven cannot be successfully operated to produce inferior coke. The coal for coke ovens must also be suited to the product required. The sale of metallurgical coke readily becomes more difficult, as the ash in it exceeds 10 per cent. and the sulphur 1 per cent. On this account many good gas coals are not as suitable for coke-oven use. With this limitation on the coal supply, the regenerative oven calls for twice the amount of coal to produce the same gas, and this in many cases will present great difficulty to-day.

Each separate case thus opens up difficult phases demanding the highest commercial and technical judgment to be applied to the study of the varying factors likely to operate for and against the proposal. The substitution is probably only worth considering where much extension or renewal of manufacturing plant is contemplated, and then only when the regular supply required is fairly large. Thus it is to be feared that all the chief influences will in general operate collectively against the introduction of the thermally more efficient coke-oven method of gas supply.

Discussion

Mr. T. Hardie said he was very much interested in the last paper as a manufacturer of gas, but he did not agree with all that Mr. Wright had said. There was no doubt that coke oven gas was quite suitable for distribution for domestic purposes. When the author inclined to the view that under most circumstances the coke oven was the best method of producing such gas he differed from him. The local conditions were most important. In the first place there must be a demand for the coke produced, otherwise there would be the carrying of the coke to wherever it was required, whereas in manufacturing gas in the ordinary way the coke was saleable to a large extent in the district in which it was manufactured. It should not be forgotten when reading the tables Mr. Wright had given that gas manufacture fluctuated considerably. If nothing but coke ovens were adopted it would mean that a large proportion of the plant would be laid off for a considerable period of the year, and repair costs would naturally increase. The figures of his firm in pre-war days did not correspond with the figures given in the paper. The ordinary plant for manufacturing plant to-day could be reduced to half of pre-war cost on a comparative basis. Regarding the efficiency of the new plants it was possible to recover the waste heat not only from the settings, but from the coke itself. It seemed to him that if that waste heat was recovered there was not much waste left.

Mr. J. E. Weyman, referring to the paper on blast furnace gas, said there was no doubt that the Holberg-Beth system had been successful, but there was now a later American plant much more effective. There was no cooling of the gases, and it was a more suitable process.

Mr. E. E. Wood, referring to the Hewson-Fowles paper, said he would like to know where there was a firm making one ton of steel from 8,000 cubic feet of coke oven gas. His own figures were at least 20 or 30 thousand more than that. The figures in the paper showed a gas engine to be the more economic proposition, but the figures which he had got out showed just the contrary.

The Author's Reply

Mr. Hewson, replying to Mr. Wood, said that with reference to the ton of steel made by 8,000 cubic feet of coke oven gas, that figure was taken from the *Iron and Steel Journal* in 1914, and confirmed by Sir Robert Hadfield. He would refer the question of steam turbines and gas engines to Mr. Fowles.

Mr. Fowles said that one gentleman had referred to the American plant. That plant had yet to prove that it could make gas in this country. He would like to put the case in a general way, and say that by the adoption of the Holberg-Beth system they were saving about a penny per unit on the system. They were buying at a 1¼d., and now produced at less than a farthing. The blast furnace managers said at first that they preferred the steam turbine, but now they preferred the gas engine, as it kept the burden of the furnace free. If the smaller coke were used the reciprocating blow engine helped in that direction a great deal. It had been said that gas engines were beaten by steam turbines, but he submitted that they had proved they were not. The Newcastle Electric Supply Co., who for years had used the waste gas under boilers, now used gas engines, and were getting more than double the units. The gas engine had suffered in the past because it was not properly handled and looked after, nor was the gas properly cleaned. In using blast furnace gas they were free from tar troubles, the engines ran freely after 15,000 hours' work, and required no cleaning. Though it was proposed to inspect them every three months it was found that every 18 months or two years would be sufficient. Apart from the question of £ s. d., they had to think of the national welfare, and there was not an unlimited supply of coal. In addition to the other benefits of the system they claimed £9,000 a year from the potash recovery, which was obtained without difficulty. It was got out of the hoppers perfectly dry, and put straight into the bags to be sent to the rails.

Mr. Wright said that so far as Mr. Hardie's remarks were concerned he (Mr. Wright) was at fault for not reading more of the paper, as he had dealt with most of the points raised. He agreed that coke ovens could only be substituted in areas where the coke could be sold readily. Whilst he agreed with much that Mr. Hardie had said, there were cases where large expenses would be incurred in extending gas plants and gas engineers should consider the possibilities of coke ovens more than they did. Mr. Hardie had spoken of the profits on coke and residuals being higher than the figure he had given. In the case of Newcastle he could understand that as costs would be lower than if the gas works were in the South or Midlands. With regard to the price of gas in Middlesbrough, the current price was 2s. 4d. per 1,000 cubic feet, and he knew of no gas plant selling at less than that. The auxiliary gas plant was erected because the coke oven output was too small to deal with the increased demand.

The session concluded with a vote of thanks to the authors of the various papers.

Metallurgical Session

Some Properties of 60 : 40 Brass

In the course of Prof. C. H. Desch's paper on this subject, it was pointed out that in the course of using very large quantities of brass of approximately 60 : 40 composition in processes which involved many turning and drilling operations on automatic lathes it was found that rods supplied by different manufacturers gave widely differing results in the machine shops. In one instance a change from one brand of brass to another, nominally of the same character and composition, led to a drop of 40 per cent. in the output from the automatic lathes, whilst at the same time the wear on the tools was so greatly increased as to reduce their average life to one-fourth of its former value. The present investigation was undertaken with the object of throwing some light on the cause of such remarkable differences. A selection from the results has been made, and the paper gave data relating to rods from sixteen different manufacturers.

The composition of brass of this class always departs more or less from the nominal standard of 60 per cent. copper and 40 per cent. zinc, owing to accidental variations in the manufacture and to the presence of small quantities of other metals. A certain amount of lead is almost invariably added, with the object of improving the machining qualities; iron is usually

present as an impurity; manganese or aluminium is frequently added as a deoxidiser when casting; and tin or nickel is sometimes added with the object of increasing the strength of the alloy. The rather high percentage of some of these metals in a few cases is no doubt to be attributed to the use of scrap in making the billets from which the bars have been rolled or extruded.

On the subject of variations from the normal 60 : 40 composition, it is the practice of some manufacturers to use a considerably larger proportion of zinc in billets intended for extrusion. The higher the zinc the more readily is the alloy extruded under the usual conditions of temperature. This procedure results in the production of a bar which is hard to machine. By far the best results are obtained from an alloy containing 40 per cent. of apparent zinc, whilst the true percentage should be only slightly less, the difference being made up by lead. The quantity of the latter metal may approach 2 per cent., but 1·5 per cent. is probably sufficient in most cases. Tin, iron and aluminium should be reduced to the lowest possible proportions. The best alloy in the whole series, as proved by workshop experience extending over many months, was the American brass, No. 618, and this was used as the standard of comparison throughout the experiments. It has the highest chemical purity of any of the specimens, and contains exactly 40·0 per cent. of apparent zinc. One of the worst is No. 616, which contains the largest quantity of impurities.

A comparison of the results leads to the conclusion that an arrangement of fine, fibrous α crystals, separated by a comparatively small quantity of β, is the most desirable structure for machining purposes. This is obtained by employing an alloy containing as nearly as possible 40 per cent. of apparent zinc, and extruding at a moderate temperature. Such an alloy, however, flows less readily than one with a higher proportion of zinc, and powerful presses have to be used. Some experiments were made with a series of billets containing 60·5 per cent. of copper, and these were extruded in the ordinary way from a 600-ton press. The billets proved to be very hard, and were liable to stick in the press, so that three of the bars produced were only of one-half the normal length, half of each billet being left in the press. The structure was quite satisfactory, being fine and fibrous. It was ascertained that the presses used by the American firm which produced the brass No. 618 were of much greater power. It would be possible to use the presses of lower power for the 60 : 40 alloy, but the temperature would have to be high, and the fine structure would not be obtained.

Recent Developments of the Electric Furnace in Great Britain

MR. D. F. CAMPBELL, M.A., A.R.S.M., in his paper stated that in no branch of metalling have greater advances been made during the war than in the development of iron and its alloys, which has given us materials of extraordinary strength and physical properties.

In 1914 the quantity of energy used on electric furnaces in Britain, excluding those used for aluminium, was probably less than 6,000 H.P., but on the day of the Armistice the total capacity was in excess of 150,000 H.P., of which 135,000 H.P. was producing steel, and 18,000 H.P. was working on the reduction of chromium and tungsten ores. Similar increase has also been made in the electrolysis of brine for the manufacture of caustic soda and chlorine to meet war requirements, and the older processes are now superseded by the electric method of manufacture. The manufacture of large quantities of phosphorus by electric-furnace methods was necessary during the war, and the excellent fused silica ware for laboratories and chemical works, made with such remarkable success on the Tyne, is, perhaps, the most interesting example of the use of the electric furnace for fine work. The making of electrodes, an essential subsidiary industry for electric furnace work which was unknown in Great Britain in 1914, is now established in Newcastle and elsewhere, and also the manufacture of artificial graphite in the form of electrodes for furnace work and electrolysis and powder for accumulation and similar purposes.

Electric melting enabled us to use advantageously the vast quantities of steel turnings made in the shell factories. The re-melting of nickel-chrome steel is a wasteful and most difficult process in all other furnaces, but the reducing conditions and absolute control of the electric furnace make it possible either to retain or remove at will most of the chromium, and thus large quantities of a valuable metal were saved. The economic manufacture of stainless steel has been rendered possible only by the electric furnace, which is required both for the preparation of the refined ferro-chrome and the steel melting. The application of electricity and metallurgy has given us the low-hysteresis iron that is now universally used in the transformers, for this is made by the addition of high-grade ferro-silicon to the steel. The use of the arc furnace in one of its many forms is now almost universal, and the fascinating principle of induction heating is no longer used. Electric furnaces owe their value to their intense reducing conditions, as they utilise the only practical source of heat which does not require oxygen for its generation.

The development of electrical energy on the North-East coast is undoubtedly the most progressive and comprehensive system in Great Britain, and it is hoped that the development of other districts will result in schemes for linking up existing supplies, exchange of surplus capacity with a general reduction of stand-by plant, and the erection of a few large stations at suitable points, so that the small and inefficient stations may be abandoned or relegated to the position of emergency stand-by plant. There are great advantages in establishing certain electro-metallurgical processes in England in spite of the lack of water power, for this country is so highly favoured with the other essentials for successful industry that the supposed advantages of cheap hydro-electric energy are counterbalanced in the case of many processes in which skill and cheap raw materials are an important factor; consequently power economically generated from steam and efficiently distributed may form the basis of many electro-chemical industries.

Chemical Sheet Lead

D. W. JONES in his Paper stated that it is in the manufacture of and processes using sulphuric acid that the largest quantity of chemical lead is required, and, generally speaking, the property of resistance to attack by this acid which a lead may possess is a measure of its resistance to attack by other acids.

To determine the quality of chemical lead it is customary to make examinations by all or any of the following methods:—(1) Heat in 96 per cent. sulphuric acid up to 290°C. in five minutes, cool to 100°C., and observe loss in weight. (2) Heat in 91-92 per cent. nitric acid. No appreciable action should occur in 15 minutes. (3) Heat in 40 per cent. a mixture of nitric acid, 52 per cent. of sulphuric acid, and 8 per cent. of water. No appreciable action should take place between 93° and 109°C. (4) Heat a filed surface in a mixture of one vol. of hydrochloric acid, specific gravity 1·14, 2 vols. of nitric acid, specific gravity 1·50, and 3 vols. of water. The time required for spots of lead chloride to appear, and the time at which vigorous action takes place after boiling, are noted. (5) Heat in concentrated sulphuric acid and observe the temperatures at which bubbles of gas are first evolved and at which the lead decomposes.

Of these methods No. 5 is the one most generally favoured. When under observation by this method in some cases the decomposition of lead is sudden, total and violent, and is attended by a rise of temperature after removing the source of heat up to 27°C. With a good quality lead decomposition proceeds slowly, and is arrested when the source of heat is removed. The temperature recorded is that at which the solution becomes slightly turbid owing to the formation of lead sulphate. Since it has been found that 96 per cent. sulphuric acid (by wt.) gives figures comparable with those obtained when chamber acid is used, all observations refer to trials conducted with pure acid of this concentration.

The tests described in the Paper were carried out under the following conditions:—A test piece of rolled lead 1 sq. in. in area and 1/16 in. thick (corresponding approximately to sheet 4 lb. per square foot) is heated with 30 c.c. of 60 per cent. sulphuric acid used at such a rate that the temperature of the acid reaches 300°C. in five minutes. A suitable chemical lead when tested in this way evolves bubbles of gas at 100°C.-200°C. and decomposes at 300°C.-412°C.

In spite of the fact that copper can function as a corrective agent and will counteract the injurious effect of antimony and bismuth in lead, the author is yet in agreement with Rhead, who has emphasised the importance of using pure lead in connection with acid plant.

Chemical Engineering Group

THE Chemical Engineering Group met in the afternoon on Tuesday, July 13, in the Physical Lecture Theatre of Armstrong College, Professor Henry Louis in the Chair.

Professor Henry Louis, in opening the meeting, congratulated the Chemical Engineering Group on the success which it has achieved. Chemical engineering was a difficult subject and in many respects one which involved contradictory qualities in those who worked it. The engineer's principal object, in the words of the Charter of the Institution of Civil Engineers, was to utilise the forces of nature; the chemist was occupied in using the materials of nature. It was, however, the business of the chemical engineer to combine these two somewhat different lines of attack, and he thought they were all beginning to recognise that chemical engineering involved some of the most complex problems of the day. He was thinking, as he spoke, of the recent paper by Dr. Sulman on Flotation, in which he had at last been able to show that what had been current metallurgical practice for quite a number of years depended on some fairly advanced thesis in physical chemistry, and there was no doubt that applications of that kind would show themselves as chemical engineering developed. The subject they were going to discuss that afternoon was "Filtration," and he was particularly pleased to be able to preside at the Conference because they might remember that in his address at Bristol two years ago, he drew particular attention to the need for a study of filtration, and he ventured to suggest that even chemical engineers had not paid sufficient attention to the need for continuous filtration processes. With the increased cost of labour nowadays, it was necessary to make all operations as continuous and as automatic as possible, and that was a point of view which the chemical engineer should not lose sight of. The subject of filtration was, of course, a difficult one, and it might be as well if they cleared their minds at the outset and tried to understand exactly what was meant by filtration. It was not easy to frame a perfectly satisfactory definition and probably not all people would agree as to what they really meant by it. What he understood by filtration was the more or less complete separation of the solids and the liquids by means of a porous septum. He did not know that anything else than that was, strictly speaking, filtration. Of course, filtration did not always imply complete separation; in fact, complete separation was quite impossible. It was possible to get a filtrate which was absolutely free from solid matter, but the other side of the problem was a far more difficult one, viz., the complete separation of the finer particles.

The Principles of Technical Filtration

IN a paper dealing on the above subject, Mr. Emil Hatschek, said that the first and fundamental point to be noted is that, for a given system of solid and liquid, the whole problem is completely determined physically. The size of the pores in the septum (he stated) is fixed or has, at any rate, an upper limit; the largest number of pores of such size is, of course, desirable, but this is a technical matter, and simply means a choice among a comparatively small range of materials. As soon as filtration begins the pores in the surface of the filtering medium are throttled more or less by the particles which settle on them, and as it proceeds the liquid has to escape through these throttled orifices and through a layer of particles of increasing thickness. The structure of this layer is also fixed by the size and shape of the particles, and is, for a given precipitate, remarkably constant. The resistance offered to the flow of liquid varies considerably from one material to another, but in all cases it increases as the thickness increases, until a limit is reached—*i.e.*, until, with a given pressure the rate of flow becomes so small that it is advisable to discontinue the process. This limit is an *economical* one only; it depends, roughly speaking, on the way in which higher pressure increases the first cost of the plant, and, the pressure being given, on the balance between the cost of obtaining a thicker "cake" and the cost of removing it at more frequent intervals.

The second point is that since the structure of the cake is fixed by the size and shape of the particles, not only the pressure required to force through a given thickness of it, but also the percentage of mother liquid remaining in it at the end of the operation is fixed within surprisingly narrow limits. It is not affected by the design of the apparatus nor by the pressure used—a point which seems self-evident, but is realised apparently by an exiguous minority of technical men. Only actual experiment can, in the case of an unknown residue, give any information regarding the amount of liquid retained by it. It is hardly necessary to say that the appearance and consistency of the cake are no guides. In a great number of processes it is necessary to remove the mother liquor as completely as possible, either because it contains the valuable constituent or because its presence in the cake is detrimental. The most common method is to displace it by water (or other solvent)—*i.e.*, by "washing" the cake, as it is usually called. The ideal—displacing the mother liquor by an equal volume of water or solvent—is practically unattainable, as a certain amount of diffusion is unavoidable, but where this is slow the volume of wash-water may be very little in excess of the volume of mother liquor to be displaced. The process of washing resembles the process of filtration, with two important differences—the liquid passes through a constant, instead of a gradually increasing, thickness of residue, and the process, unlike filtration itself, is not self-regulating.

The point to which washing is carried is again settled by economic considerations—such as the balance between the cost of evaporation and the value of the dissolved substance—unless, for instance, traces of the mother liquor are absolutely detrimental to the purpose for which the residue on the filter is required. If this is the case, the end point is by no means easy to determine; generally speaking, it is not sufficient to test the washings only, but the cake itself should be examined. Apart from very exceptional cases, adsorption always occurs on the particles of the cake, and although the washings show no reaction, a thin layer of adsorbed solute is nevertheless present, which may be discovered by testing the cake itself. As the latter is dried, the concentration of the adsorbed solute increases and may attain quite objectionable proportions even when washing has been carried so far that the last washings show no reaction. The case is aggravated when the particles of cake are themselves porous—*e.g.*, materials produced by fusion with alkali or the like. In these cases the wash water may quite rapidly displace the mother liquor between the particles, but the liquor in the pores of the particles can escape only by diffusion, which is necessarily slow. When these conditions prevail, even the cake may appear neutral after prolonged washing, but shows marked alkaline reaction again after standing for some time, during which diffusion out of the particles into the water between them occurs. It is therefore quite useless to hasten washing, and the sound procedure is to make it so slow that it proceeds *pari passu* with diffusion. This, again, is a state of things which cannot be altered by the design of the apparatus or by increasing the working pressure, but must be accepted as following inevitably from the nature of the material treated.

Both during filtration and during washing it is necessary to maintain a difference of pressure between the two sides of the septum.

The conditions the filtering material has to fulfil are three: It must have pores of the required size and as numerous as possible; it must be of sufficient strength mechanically to stand the pressure applied, suitable methods of support being assumed; finally, it must be chemically indifferent to the liquids to be filtered.

Discussion

Dr. J. W. HINCHLEY said that a paper by the same author in 1908 had a bearing on the present one, in that some misconception was likely to arise from both. The present paper stated: "As the pressure is applied to or through the liquid in which the particles are suspended, the latter are in no sense pressed together, but are simply left behind as the corresponding quantity of liquid escapes through the septum. It therefore follows that the structure of the cake and its content of mother liquor are not affected by the pressure employed—a point on which the most common and serious misconception exists." The general inference to be drawn from that was that the resistance to the flow was not affected by the pressure, but that was not true, and he would like the author to say exactly what he did mean, because he did not think he had expressed himself quite clearly on the point, because the statement made in the paragraph to which he had referred could not be quite correct. If they washed a precipitate which was filtered at say

10 lb. per square inch, and washed it at a range of pressure from, say, 10 lb. to 40 lb. pressure, it would be found that the rate of washing was proportional to the pressure. On the other hand, if they filtered at a higher pressure, the rate of washing would be more or less proportional to the pressure, but it would be very different from the former case. At very high pressures of washing with low pressures of filtration, the cake could be broken down. That was in accordance with what would be expected; that the structure of the clay was far more porous, and the resistance of the cake was greater. Therefore, by filtering at low pressure and washing at high pressure, they got through the work much more efficiently. The rate of washing was faster, of course, if they filtered at a low pressure than if they filtered at high pressure.

Mr. J. R. O'SHAUGHNESSY suggested that filtration should be regarded as the separation of the visible matter, and not the fine particles which existed in material in a colloid condition.

Dr. W. R. ORMANDY expressed the hope that the term filtration should not be limited in the manner suggested by the last speaker. The author in a paper referred to the possibility of filtration of ultra-microscopic particles by the possible use of septa made of nitro-cellulose and other bodies in a method which had been worked out by Burton for use primarily in the separation of bodies such as were investigated in bio-chemical work, and surely it was quite as much filtration to take out any solid particle which was capable of being distinguished from the liquid in which it had been suspended by any of the ordinary known scientific means. If we could discover by the microscope and free such fine particles, then surely that fell under the heading of filtration, or ultra-filtration.

"Sturgeon" Self-discharging Centrifuges for Separating Solids from Liquids

AFTER giving a short historical survey of the development of the self-discharging centrifuges, Mr. R. A. Sturgeon explained with the aid of diagrams "Sturgeon" centrifuges, and stated that tests on a large scale are now being carried out in connection with the application of the "Sturgeon" centrifuge to the paper industry. As an instance of what may be expected (he said) it may be assumed that a certain effluent from a paper mill contains 400 parts of solid matter in suspension per 100,000 parts of effluent. If this be treated in a "Sturgeon" centrifuge with a separating cylinder 30 in. in diameter and 20 in. deep on a 10 seconds basis (that is, one complete filling of the centrifuge with the liquor every 10 seconds), the deposit of solids reaching a thickness of 2 in. before a discharge is required, and the solid matter containing, while in the machine, about 60 per cent. moisture :—

The rate of flow works out at about 330 gallons per minute, and 1,330 gallons will flow through the machine before the full deposit is made. That is to say, the liquid will be flowing for $1,330/330 = 4$ minutes between each discharge. Assuming that the discharging operation takes one minute, it will be possible to obtain 12 discharges per hour. The net result is therefore: Volume dealt with per hour, 16,000 gallons; weight of solids, measured dry, 640 lb. per hour; weight of solids, as 60 per cent. cake, 1,600 lb. per hour.

The present value of the paper pulp recovered from the effluent will be at least 1d. per lb., so that the value of the solid matter regained, which would otherwise have gone to waste, would be about £2. 10s. per hour, or, say, £5,000 per annum. The cost of a machine to do this work would be about £1,200.

The degree of clarification depends on the proportion and nature of the suspended solids, the rate at which the liquid is passed through the centrifuge, and the precautions taken to reduce eddies to a minimum. The following results were obtained from a 15 in. "Sturgeon" centrifuge with an overflow near the axis, the liquor containing a mixture of magnesium and sodium carbonates (such as is used for water softening) in various degrees of concentration. The solid matter was very light, flocculent and finely divided :—

At 2,000 revs. per min., rate of flow, 10 gallons per minute; influent, 430 pints, solids in suspension per 100,000; effluent, 23·3 pts., or 94·6 per cent. clarification.

At 2,000 revs. per min., rate of flow, 28 gallons per minute; influent, 16 pts. solids in suspension per 100,000; effluent, 2 pts., or 87½ per cent. clarification.

At 2,500 revs. per min., rate of flow, 10 gallons per minute; (*a*) influent, 540 pts. solids in suspension per 100,000; effluent, 18·5 pts., or 96·6 per cent. clarification; (*b*) influent, 1,860 pts. solids in suspension per 100,000; effluent, 30·2 pts., or 98·4 per cent. clarification.

Discussion

Professor HENRY LOUIS said that although the action of the centrifuge was not strictly within the definition of filtration, it was an adjunct to chemical and chemico-metallurgical operation; and these centrifugal machines were playing and would play a more important part in a complete review of the subject.

Mr. F. SPROXTON asked if the Sturgeon centrifuge was suitable where the suspended matter was of a fibrous character.

Mr. H. M. RIDGE asked the author how far he had carried the use of this machine; whether it was still in the experimental stages, or whether it had been developed and put into regular works use. If so he would like to know whether he had had any difficulty in keeping the pipe tight, and whether he had experience of being able to run a machine continuously or whether there had been mechanical troubles.

Mr. R. A. BELLWOOD asked if the centrifuge was useful for material containing 50 to 80 per cent. of solids.

Mr. L. H. LAMPETT said he had been carrying out some experiments on the centrifugal separation of liquids which had to be kept warm, viz., the separation of fatty substances. Up to now, however, he had failed completely because the output obtained had been so small and so slow that it was economically unsound. The specific gravity of the liquid of the effluent was about 0·92 to 0·95, and of the solid, which was of a gelatinous nature, 1·25. Had the author carried out any experiments with liquids and solids of that nature? If he had, and with success, there was a big opening for such a machine.

Mr. J. R. O'SHAUGHNESSY asked if the author had carried out experiments on sewage liquors on a sufficiently large scale to be able to give reliable figures with regard to cost per million gallons.

Mr. R. E. JACKSON said it seemed to him that the pressure applied must be different with each different material that was used.

Mr. A. W. RHEAD asked what was the percentage of water required for the removal of the cake compared with the amount of the filtrate, and also what was the rate of filtration. How long did it take to separate 1,000 gallons and was there any possibility of recovering cake as a cake, which was so essential in many filtration problems? He also asked whether the machine could be applied to obtaining ferric oxide from a precipitate.

Dr. L. F. GOODWIN wanted to know what were the limits within which these machines would work. Up to what percentage of solids was the Sturgeon centrifuge economical? Was it economical up to 10 per cent. or 30 per cent. of solids? He did not think the author would recommend it for such a high percentage, but as the economical limit had probably been found, perhaps the author would say what it was, both from the point of view of efficiency and cost.

Mr. W. J. PALMER asked whether apparatus could be used with a homogeneous mixture of several substances of dissimilar specific gravities. Would the machine differentiate in the solid state between the different substances in respect of their specific gravities?

Mr. A. E. MALPAS said he had always understood that the finely divided particles gave the most trouble, and that the finer the particles the higher the speed should be of the machine. He understood that the speed of the author's 36-in. machine was 1,000 revs. per min Early in the war, he came into practical contact with the question of separating precipitants which were very fine from a liquid which was very dense. It was stuff that would not settle at all—a new war product—and in desperation he got some Gee separators which were being used in Cornwall for separating or grading china clay into different sizes. This machine ran at 5,000 revs. per min. and at first it shook its foundations to pieces. They then put it underground, but they were always afraid it would kill somebody. Even with 1,000 revs. per min. some nasty vibrations were liable to be set up, because each machine had a critical speed depending on its end weight and out of balance, would set up dangerous vibrations, and looking at the diagram of the machine it was seen there were a large number of loose parts which, after a short time of working, might be expected to wear sideways and all shapes and set up a good deal of rattling. He did not expect the water valves to remain tight for long, and he would imagine that some of the colloidal precipitate would find its way downwards in the piston and block the piston. Therefore he would like to know how long the machine had been run without being taken to pieces and having a thorough clean.

Capt. C. J. GOODWIN said the author had not touched on the question of the temperature at which filtration, or separation, as it was in this case, took place. It was a fairly well known fact that in ordinary sedimentation tanks, as distinct from these machines described in the paper, the rate of sedimentation was considerably greater at higher temperatures. When one of these machines was operated at a higher temperature, there was an additional factor in regard to the viscosity of the material, which became less at the higher temperatures, in most cases, and the author would be benefitting chemical engineers if he could have some investigation made as to the effect of increased temperature on the rate of separation of various materials.

The Author's Reply

Mr. STURGEON, replying to the discussion, said the machine was quite suitable for treating fibrous materials if the fibres were not

more than ¼ in. long. In reply to Mr. Ridge, the machine was only in the experimental stage and had not been used in works practice on an extended basis, and he preferred to defer any statement as to cost and the effects of long periods of continuous running until there had been more time to work on these lines. Up to the present, the machines had been working on intermittent running and it had shown certain weaknesses, but at the same time the work that had been done made it perfectly clear that there was nothing to fear from continuous and extended running. As an instance of its working he mentioned that the machine had been run for 7 hours at a stretch with a penny balanced on it through all the operations of starting, stopping and discharging. As to whether the machine was suitable for semi-liquids containing 50 to 80 per cent. of solids, the only condition was that the material should be able to flow into the machine and should not contain particles which could well be screened out beforehand. With regard to the separation of liquids by a specific gravity of 0·92 to 0·95, and solids of 1·25, he said he had been able successfully to remove the dirt from wool washings. He had not worked with sewage because working had not been on a sufficiently large scale, but he hoped shortly to be able to give the desired information as to both running costs and efficiency of working. Mr. Jackson had said that adjustments would have to be made with every different class of material, but he had found it possible to deal with a large variety of materials in identical machines, provided the general result required was the same. The percentage of water required in proportion to the solid, to move the solid from the drum, was dependent on the frequency of the discharges and the frequency of discharges depended on the amount of solid that was separated in the machine. The amount of liquid required to effect the discharge was one cylinder full per discharge. The rate of filtration or separation depended entirely on the nature of the solids, and another point in this connection was the nature of the effluent required. The question of the recovery of the cake as a cake had been mentioned. One of the machines described was designed for that purpose. The percentage of solids to liquid, mentioned by Dr. Goodwin, was a question which could only be answered in any specific case, because it varied practically with every material. Mr. Palmer asked as to whether the machine would differentiate between solids of different specific gravities. The machine mixed them up, and he had not yet gone into the development of a grading machine. As to the machine shaking to pieces, that had not happened. Mr. Malpas also spoke of the passage of solids past the piston. That was liable to happen with some classes of solids, but in one of the designs provision was made for getting at the valves, without pulling the machine to pieces. Capt. Goodwin raised the question of high temperature, viscosity, and the effect on separation of increased temperature. He agreed that a great deal had yet to be done in that direction, but he had not yet done any work of that kind, although he had dealt with liquors at comparatively high temperatures.

Filtration of Colloids

DR. W. R. ORMANDY, who contributed a paper on the Osmose Process for the Filtration of Colloids said that the special method of treatment under consideration depended on the utilisation of certain properties of finely divided particles in suspension. The new process for the application of physico-chemical laws is (he said) in many respects so new that it is necessary to deal shortly with the under-lying principles before the methods of their application, and the limitations of the process can be properly understood.

Colloids can be divided into at least two groups, the reversible and the irreversible colloids. To the reversible group belong such substances as glue, gelatin, which can be dissolved in water, dried, and again dissolved in water without any great alteration in properties. To the irreversible group belong such substances as albumin, which after treatment with boiling water become absolutely insoluble. For the most part, however, the nature of the colloid is largely dependent upon the size of the particles. Sufficiently fine particles when suspended in water exhibit what is known as the Brownian movement, which is the more energetic the smaller the particle. This Brownian movement is now regarded as the visible symbol of molecular bombardment, as has been largely proved by the researches of Professor Perrin. Generally speaking particles of matter exceeding 0·0001 mm. in diameter will eventually settle from solution. This is about the limit of microscopic visibility. The fact that particles below the limiting size do not settle means that the molecular and electrical forces outweight the action of gravitation. So far back as 1869 Jevons noticed that the intensity of the Brownian movement of clay particles was increased by the addition of traces of certain types of bodies and inhibited by the addition of other types of bodies. In 1895 Bliss noticed that a clay suspension exhibited increased Brownian movement with the addition of traces of alkali, but that the addition of further quantities again reduced the movement. It has long been known that the addition of certain types of chemicals tended to cause coagulation of colloids suspended in water; thus the addition of calcium hydrate and aluminium sulphate to bring about the settlement of sewage sludge is ancient history.

These illustrations show he position of knowledge relating to the effect of electrolytes on colloidal suspensions. It remained for Count Schwerin to see the bearing of these little studied laws in their commercial application.

Dr. Ormandy then took a suspension of ball china, to which had been added the necessary amount of electrolyte, and poured it into a copper cylinder having a carbon pole suspended in the centre. On passing a current of about 60 volts through the liquid so that the central carbon pole was the anode, the clay was not only deposited very rapidly on the anode, but, although the clay was deposited under water, nevertheless the clay on the anode was found to be remarkably dry. This result was due to the peculiar action by which water was repelled from the anode through a porous diaphragm, the action being being known as electro-endosmosis. If, instead of using a stationary anode, a horizontal rotating anode was used, this process could be made continuous. The machine shown was a working model of such a continuous plant.

The anode Dr. Ormandy stated is a rotating drum made of a special alloy to resist the corrosive action, whereas the cathode consists of copper strips placed round the anode, and distanced about ¾ in. therefrom. The bottom of the containing vessel contains paddles to keep the clay in suspension. The clay suspension consists of clay particles having a comparatively strong negative charge and other bodies having a very feeble negative or no charge at all. In the electric field between the cathode and the anode the clay particles are strongly attracted to the anode. The moment a film of clay has been formed on the anode the water contained therein is violently ejected towards the cathode, and this stream of water tends to sweep away all but the particles having a high negative charge, which, in spite of the water current, are drawn to the anode. The machine acts not only as a means for collecting clay from the water suspension, but is a selective collector, and simultaneously acts to a considerable extent as a drying machine.

Discussion

Mr. C. S. GARLAND asked whether the filter press had actually been made and was it a practical machine? If so, where was it obtainable and what was the output?

Mr. W. R. SIBBOLD asked whether the process was applicable to suspensions in liquids other than water? There were innumerable patents covering the separation of oil in suspension in water by electrolysis, and he wondered whether this process could be applied to the separation of fine suspensions of water in vegetable or mineral oils and also suspensions of fine vegetable matter varying from fibres to those of a mucilaginous nature.

Mr. G. KING asked what excess of alkali was necessary; also to what extent it was possible to wash out the electrolytes, and the proportion of moisture left in the dry material? Further, was the dried material dried by the heat of the cylinder on which the clay was deposited or was it dried by electric endosmosis?

Mr. A. E. MALPAS said that at the present time they were using on a large scale what was known as the Lodge or Cottrell process for the precipitation of dust and other matters from gases. In the latter process a much higher voltage was used than in the one described in the paper, and they were using uni-directional current up to from 80,000 to 100,000 volts, with the result that the precipitation was obtained on the cathode and not on the anode. The Cottrell process was being applied to the precipitation of sulphuric fumes from exhaust gases, where they became a nuisance to the surrounding country. It was also applied to a great many other things, such as getting rid of SO_3 gases from oleum plants and things of that sort. He regretted that the paper did not give a diagram of the Osmosis machine. The process treated colloids in a perfectly practical way and he was glad to see that such good results had been obtained.

Mr. S. C. WILLIAMS asked if the process was applicable to bodies other than the well known colloidal class? In the organic chemical industry there were serious problems such as in the sulphonation of naphthalene bodies in which complex oxidation products were formed, especially when oleum or any free SO_3 was present, causing oxidation which led to complex products to come down in a tarry form, which it was practically impossible to filter. The same thing also occurred in potash and soda fusion under pressure in an auto-

clave. If, therefore, the process could be applied to highly oxidised organic bodies and in some cases colloidal hydroxides of iron which got in from the vessels in which the process was carried out, it would be extremely valuable.

Mr. A. T. HENLEY wished to know if the process had been or could be applied to the continuous sterilisation of liquids in bulk by removing the bacteria possibly in an albuminoid amalgam.

Mr. H. H. MORGAN enquired if there had been any experience with the process in the preparation of calcium carbonate, and in the clarification of suspensions in non-aqueous liquids of very poor conductivity.

Mr. L. G. WILSON asked if there had been any experience with the process in connection with the purification of dyestuffs, which frequently contained a small proportion of some matter usually considered impossible to remove, and which in some cases was rather troublesome. He also wished to know whether it was possible by this means to separate a boiled starch solution.

Dr. Ormandy's Reply

DR. ORMANDY, replying to the discussion, said the filter press was actually being used in Germany. In this country, however, attention had been directed to the Osmose machine, which was a commercial success, running on commercial quantities. The filter press had been developed in Germany to an instrument of two units in diameter capable of handling half a ton per hour of collodial peat. We had not got so far in this country, on account of the difficulties of constructing such a machine, owing to the high electrical pressures used. The cost of treatment, so far as current was concerned, varied with the nature of the clay and the nature of the water and soluble impurities in the clay, but it was possible to get as low as 2 units per ton or as high as 40 units with the filter press. Mr. Sibbold had mentioned the removal of vegetable matter and oils, but that branch had not yet been investigated, but he had been told that the Vienna branch of the company had succeeded in removing vegetable oils. As to the excess of alkali necessary, the total amount of electrolyte which was added was 0·037 per cent. of the weight of the clay, but he added to a kilogramme of clay 6 cc. of 10 per cent. solution of sodium silicate, so that the conductivity was very low. The greatest loss of current was generally due to the presence of electrolytes dissolving out from the water in the clay substance itself. The drying of the clay could not be due to the heat of the cylinder, it was due to electro-endosmosis entirely. It was impossible to deal with complex organic bodies such as fusion containing large amounts of caustic soda, which had an enormously high conductivity. He believed, however, that it was possible to bring about a selective separation of certain dyes, if one dye happened to be electro-positive and another electro-negative. As to the sterilisation of organic liquids, he could say that one of the great applications of the process in Germany, working in conjunction with the Rockefeller Institute in New York, was in the sterilisation of vaccines, it having been discovered that it was possible with a really very small amperage to kill the live bacteria in a vaccine instead of having to sterilise the vaccine by the addition of various chemicals. He had not tried the process on the preparation of calcium carbonate. It was possible to use this phenomenon in non-aqueous solutions, but it was very difficult, and it was a branch that was only just being started. He could not say that the separation of boiled starch was possible. The whole work was novel and an attempt was being made to get together the sum of £25,000 to start a Chair of Colloidal Chemistry at Manchester University. The Osmose Co., in Germany, had spent £27,000 a year in salaries alone to scientific men for research work, for the past 12 years, and we could not hope, in our small way of working, to arrive quickly at the position which the German had reached after many years and with a large expenditure of money. It was a disgrace that we had not yet a Chair of Colloidal Chemistry in the whole of the country.

A hearty vote of thanks was accorded Dr. Ormandy.

Sharples "Super-Centrifuge"

MR. S. H. MENZIES, who contributed a paper on the above subject, said the "super-centrifuge" applies the settling action of gravity highly intensified in two classes of operation, viz., that in which solids are settled out of liquids, which may be termed "clarification," and that in which one liquid heavier or of higher specific gravity is settled apart from another liquid of lower specific gravity, which may be termed "separation."

Two typical processes in connection with "clarification" are those of dry cleaners' benzine recovery and the clarifying of lacquer or nitrated cellulose. In the former (the author stated) we have an instance of a heavy suspended material in an extremely light liquid, whilst in the latter very light solid material is suspended in a heavy and highly viscous liquid. In both cases in the "super-centrifuge" clarification is complete and the suspended solids entirely eliminated. These two cases, however, afford good examples of the manner in which physical characteristics affect capacity of the machine. In the case of benzine clarification the flow through a Sharples "super-centrifuge" can be taken comfortably to 250 gallons per hour, whilst in the case of the nitrated cellulose, where the process is one of eliminating fine vegetable fibres of cotton or pieces of cotton-husk, the flow through a Sharples' machine to secure the best grade of lacquer entirely free of all solid suspension usually does not exceed 70 to 80 gallons per hour.

In the "super-centrifuge" treatment of varnish one of two objects may be accomplished. Where ageing is not carried out to any great extent the complete removal of all suspension which would mar the coat or settle in the can is effected, and a brilliant product results. In the case of varnish which has to be aged, treatment by the intensive "super-centrifugal" force will secure a firm, thin layer of sediment not easily disturbed on decantation as against the bulky sludge, which proves troublesome by reason of its ready disturbance at decantation.

Where "separation" is alone in question two characteristics are essential in the constituent liquors—viz., immiscibility and difference of specific gravity.

The functions performed by the machine include such processes as the separation of finely-divided wax from an alcoholic solution of shellac; the separation of bacteria from serums, for which the machine found a wide use during the recent war; separation of pigment from paint and enamel, and quantitative analysis of these. Many complete processes have been worked out in which the super-centrifuge itself constitutes but one feature; amongst these may be mentioned the recovery of neutral wool fat from scouring effluent; the separation of vegetable oils from soap stock; the dehydration of water-gas tar; clarification of glue and of nitrocellulose liquors, and the separation of wax from mineral oil as before mentioned.

Discussion

Mr. E. T. BREWIS asked what was the speed of rotation of the machine and whether it was easy to dismantle the rotor and clean it. He had had the opportunity of handling one of the laboratory machines, and this operation of dismantling and cleaning seemed to him rather difficult.

Dr. R. S. MORRELL said he had used the small laboratory apparatus and had found a difficulty when dealing with viscous liquids containing a solid which was partially soluble, or at any rate whose solubility increased with a rise in temperature. He found there was a certain rise of temperature in the liquid so that although the effluent was clear, yet owing to the temperature rise, on standing it became clouded, and the apparatus, owing to that defect was not so efficient as he would desire. Could that defect be overcome?

Mr. W. McD. MACKAY asked if the settling out of wool fats, which had been referred to was done by simple subsidence, or by a slow rotation of the machine

Mr. MENZIES replying to Mr. Brewis said the normal speed of the laboratory machine was 40,000 r.p.m. With the commercial machine the speed was 16,000 to 18,000 r.p.m. The question of keeping the bowl clean was got over economically by having a spare bowl and inserting it when the bowl on the working machine required cleaning. With regard to the clarification of viscous liquids mentioned by Dr. Morrell, the only way to get over the difficulty mentioned was to provide some artificial means for heating or cooling the liquid so that it would settle. In reply to Mr. Mackay he said that the pre-sedimentation of wool grease took place in a rough tank for twelve hours.

A hearty vote of thanks was accorded the author, and the meeting terminated.

The Group met on Wednesday in the Gaiety Cinematograph Theatre, Nelson Street, M. Paul Kestner presiding.

Mr. H. TALBOT, Hon. Sec., explaining the circumstances of holding the meeting in a cinema, said that some cinematograph views of the apparatus described in Mr. Gee's paper were to be shown, and he thought it might be publicly acknowledged that by the kindness of Centrifugal Separators, Ltd., the cinema had been placed at the disposal of the Chemical Engineering Group without any expense to it.

New Process of Centrifugal Filtration

IN a paper which described a new process of centrifugal filtration, Mr. W. J. Gee said it is possible completely to remove suspended solids from a liquid, however fine the particles, in a solid drum machine by centrifugal force exerted over a sufficient time. But in many cases the last few grains per gallon of exceptionally fine particles require so much time that the output of the apparatus is severely limited. Consequently it was necessary to evolve some method of dealing with the finer particles with an efficiency more nearly approaching that at which the larger solids are dealt with by centrifugal force.

A new type of centrifugal separator combining in the one apparatus a centrifugal separator, a grader, and a non-choking filter was then described by the author with the aid of diagrams, and for which the following advantages over other filtering apparatus were claimed.

1. The rate of filtration is constant throughout the charging period.

2. The filter, once made, is used over and over again; the removal of the recovered solids does not disturb it.

3. A very wide choice of filter material is available. Such materials as filter paper, asbestos, glass cloth, and so on can be used, as bursting of filter material is eliminated.

4. The removal of the recovered solids requires much less time than the cleaning of a filter press and the fitting of clean filter cloths.

5. The wear and tear of filter material is almost completely eliminated.

6. Materials which cannot at present be filtered at all commercially in filter presses, owing to choking, can be dealt with in the centrifugal apparatus without difficulty.

7. The apparatus lends itself to heating or cooling, so that materials may be treated at any required temperature.

8. The rotor can be readily enclosed completely for the filtration of volatile or dangerous liquids, which may be treated at any pressure or temperature. In recovering suspended solids from volatile solvents, loss of solvent and danger of fire or explosion are eliminated by using a totally enclosed machine.

9. The recovered solids are graded as to fineness of particle in a very exact manner, which is unvarying on repetition, so that standard qualities of materials are assured.

Discussion

Mr. F. SPROXTON said the only criticism he had to make of the Gee machine was that when dealing with a liquid containing a considerable amount of solid material in suspension, the stoppages of the machine for the purpose of clearing the residuum plates seemed very numerous, and the labour costs must be somewhat high. It had occurred to him that when dealing with a material where grading was not necessary it would be an economical proposition to combine the Sturgeon separator and the Gee separator, so that the liquid could be passed rapidly through the Sturgeon separator and reduce the amount of solids by about 98 per cent., and then pass the effluent through the Gee separator to obtain the removal of the remainder.

Dr. D. S. JORDAN said that many people were interested, not so much in the separation of solids from liquids as the separation of a clear liquid. He understood that this machine combined separation with filtration, and he would like to know if it would be possible with this machine to obtain a clear filtrate from liquids such as dilute blue liquids.

Mr. E. HOLMES enquired whether a larger output could be obtained if the machine was run more quickly, and would the grading effect in that case be less.

Mr. THORNE wished to know if the machine had been used for the filtration of difficult material such as raw sugar stuffs. It seemed to him that the apparatus, with the grading which it effected, might help materially in that respect and prevent the formation of the slimy coating which occurred in the filter press when dealing with this material.

Capt. C. J. GOODWIN, referring to the cone at the top of the machine, which enclosed three quarters of it, and only allowed one quarter to facilitate the removal of the plate, thought time would be saved if the whole of the top of the machine was exposed, so that instead of one plate being taken away at a time the whole lot could be dealt with at once. He also enquired whether the handling of the plates could not be simplified a little. It was necessary with all these machines to increase the output as much as possible and minimise the time not usefully employed in filtration.

Mr. W. R. SIBBALD said that one of the most difficult of problems was to filter crude oil, such as crude cotton seed oil drawn from the presses in the country. The material to be removed was of a sticky nature, not very much higher in density than that of the surrounding liquid, and the liquid itself was viscous. Had Mr. Gee any experience of these conditions and could they be satisfactorily met by his machine? Also, how completely could the liquid be discharged before the solids were removed?

Mr. J. A. REAVELL enquired whether the construction of the machine was such that all parts coming into contact with the liquor were made of gun-metal or copper so that such liquors as wood extract, as well as gelatine, could be tackled.

Mr. N. C. NEALE said it seemed to him that parts of the cake were apt to drop off into the machine, and he would like to know whether since he saw the machine at Felling the design had been modified so that it was easier to get at the inside of it and clean it out.

Mr. J. B. O'SHAUGHNESSY said he was interested in the proportion of water remaining in slimy sludges. What was the percentage of this water?

Mr. L. P. WILSON wished to know whether the construction of the machine was such that it would deal with solids of slightly lower specific gravity than the liquids in which they were suspended.

Mr. A. E. MALPAS pointed out that none of the speakers had given Mr. Gee credit for what he had really achieved, viz., grading of the product.

Mr. R. A. STURGEON expressed the opinion that the machine was the last word in connection with machines of its class for separating fine solids from liquids. It had the disadvantage of not being a continuous running machine, but on the other hand it had special features not possessed by similar machines.

Mr. L. F. GOODWIN said he would like precise figures of what the machine would do. It was stated in the paper that with a liquor containing 10 per cent. of solids, the drum could be discharged four times per hour. Many of them would find it an advantage if they could be given some formula or ratio to work on. Supposing the liquid contained 10 per cent. of solids, could he take it that if he fed in half the quantity he would discharge the drum eight times an hour? Supposing he increased the percentage of solids to 30, 40, or 50 per cent., would Mr. Gee recommend that type of machine in preference to a filter press, say of the Sweetman or Kelly type, or if not, where would he draw the line? In other words, at what point would it cease to be economical to use a centrifugal machine, and would it then be necessary to use some kind of filter press?

Mr. G. GUNN asked how these machines would deal with paper manufacturers' effluent, containing fibre not more than 3 mm. long, with a specific gravity of 1·5. Would it also deal with china clay of a specific gravity of 2·5, and starch with a small percentage of resin?

Mr. RHEAD said he was interested in the filtration of liquor containing solids slightly acid, but all three separators which had been described at the Conference had left the question of the materials absolutely alone, as applied to the bleaching side of the chemical industry; then there was the erosion which might occur when extracting zinc blende with acid, a gang being obtained which was decidedly gritty, containing quartz which had a great action on anything rotating. Erosion on rotating baffles in the way was far greater then the acid action, and he thought the question of materials ought to be gone into very deeply, especially in connection with wet metallurgy extraction.

Mr. Gee's Reply

Mr. GEE, replying to the discussion, said that the time taken to clean out the machine must be regarded from the commercial point of view as it was found more efficient to handle the solids added in this way than it was in the ordinary machine. Some work had been done on filtration of glue and gelatinous liquors, and he understood the results were satisfactory. It was true that the higher the speed the greater the output, but there was a limit to the strength of materials, and he would not like to be responsible for increasing the speed unduly. Grading would not be affected by the speed of the machine, but the rate of feed would vary the position of the particles in the drum. As to sugar, curiously enough he had been in Madeira during the past eight week testing out the machine on sugar, and the results obtained had been extremely satisfactory. As to the reason for the cone at the top of the machine, there must be some support for the machine, which was suspended from one beam. With regard to the filtration of cotton seed oil a good deal of experimental work had been done in that direction, and it had been found that provided the liquid could be heated to such an extent that the viscosity was reduced then a very satisfactory result could be obtained. Viscous liquids above a certain point of viscosity were very difficult to filter either on this process or any other. There was no difficulty in making the machine of acid-resisting material. Steps had been taken to prevent the cake falling into the machine, although this did take place at first, and as to the size of the machine there were two, a 36-inch and a 12-inch, the latter being about 1-10th the capacity of the larger one. As to heating materials in which the solids were lighter than the liquids, this could be done, but precautions must be taken to see that the apparatus did not choke, otherwise there would be a gradually reducing efficiency. The question which had been raised of working the filter cake was a very important one. Experiments were being carried out, and he believed he would shortly be able to announce that he had a very efficient working system. Dr. Goodwin had asked for figures. He himself also wanted them, but the machines were only just now being sent out into various works, and information as to their working was being collected as fast as possible. As soon as he had it he would be only too pleased to give it. Such figures as had already been obtained were freely at everybody's disposal. As to the output with percentage of solids, also referred to by Dr. Goodwin, it would not be possible to discharge the drum double the number of times per hour with double the percentage of solids, because the starting and stoppages would take longer than with 10 per cent. of solids, although the time taken on feeding would be cut in half. He had tested paper mill effluent with very satisfactory results, and machines were on order for that purpose.

Our report of the week's proceedings will be completed in our next issue.

British Chemical Manufacturers

Annual Meeting: A Notable Record of Progress and Practical Work

THE fourth annual general meeting of the Association of British Chemical Manufacturers was held on Thursday, July 8, in the rooms of the Chemical Society, at Burlington House, London, Mr. R. G. Perry (chairman) presiding.

The chairman, in moving the adoption of the report said that in connection with Parliamentary matters, one of the most important functions the association had to perform was to watch carefully any Bill which came before Parliament, which might or might not react favourably or unfavourably on the interests of the chemical industry. The Patents and Designs Act showed quite definite evidence of the acceptance of some of the recommendations of the Association's committee. Moreover, since the Act had been passed they had not had a single criticism of any sort from any member of the association.

Association of Chemical Plant Manufacturers

Dealing with the work of the association, the chairman stated that one of the difficult problems of the last year or two was that of the chemical plant manufacturers. They had many applications for membership from firms, and in some cases those firms could be described as being actually chemical manufacturers. That was a small difficulty, but they had never felt that the election of a chemical plant manufacturer was intended by the spirit of their articles of association. which absolutely limited membership to British chemical manufacturers. They had solved that difficulty by organising a small association of chemical plant manufacturers, and hoped to affiliate that association with their own.

"Regarding dye production," Mr. Perry stated, "not many months ago your general manager and I were asked to attend a conference with Sir Auckland Geddes, which conference lasted for a very considerable time, and finally resulted in the setting up of a committee composed of two representatives from the dye makers, two from the dye users, and two from the intermediate producers. The functions of that committee were, by means of obtaining full information and statistics from each of the three groups and co-ordinating them, to solve the problems which hitherto had remained unsolved for lack of that co-ordination. That committee has already done good work."

With regard to the information and statistical bureau, rather more than double the number of our members now contribute their information and statistics to that bureau than did so this time last year. No doubt tha is satisfactory, but I personally am still not content, and I am afraid I never shall be contented with anything less than the contribution of information by every member of our association, because I feel that nothing is more important to the influence and power of this association than the possession of complete and comprehensive data on every chemical subject.

The Transport Problem

"One item in the report I hope you have all noticed, that is, in respect of trade. We have been doing a great deal of work lately on traffic matters, and the members are very much indebted to the work of the Traffic Committee in that respect. I should like to-day to make a suggestion for the consideration of the members of this annual meeting. Traffic problems, in greater or less degree, are common to every manufacturer; the classification of his commodities, the accuracy of his rates, questions concerning wagons—company's wagons or owner's wagons—terminal charges, &c., are matters which arise every single day in every manufacturer's works. It seems to me that there can be very few, if any, problems which are so absolutely common to every manufacturer, and may I say, there is no other thing on which most manufacturers are so frequently at sea. I venture to suggest for your consideration that you might seriously consider the setting up of a traffic department within the association, headed by a really experienced xpert. I believe you would never regret it, and I hope that it may come to pass."

The chairman then referred to the Council's appreciation of the admirable work done by the group committees and the group chairmen of the association.

"Four years ago," Mr. Perry continued, "the Association of British Chemical Manufacturers did not exist, and it is not too much to say that it was only the situation caused by the great world war that brought home to chemical manufacturers the absolutely vital need of organising themselves. I need not say how much better it would have been had we realised that need not four but forty years ago. I gather that our real aim and object is to promote co-operation among manufacturers, and consequently to make it more readily and effectively possible for those manufacturers to co-operate with the Government officials. As a race we British have made individualism our prime characteristic in the past, and a very long way that characteris ic has carried us; but I am inclined to think that the time has come to call a halt and to adopt team work for the future in the place of that individualism. We have now in our hands a keen-edged sword, as represented by this association, and I believe that by the careful employment of this weapon we shall meet and overcome the many difficulties which face all manufacturers to-day. A short time ago I noticed, when I was reading the public press, the record of the speech of a managing director of a chemical company to his shareholders at their annual meeting. He was a member of ours, and he was referring to the work of his company in creating an entirely new industry in British chemical manufacture. He was telling his audience of some of his troubles and difficulties, and, in the course of his remarks, he said he was pleased to be able to say that throughout two years of great difficulty he had received nothing whatever but advice and assistance from every other chemical manufacturer with whom he had come in contact. I venture to hope that the past four years work of the association has at any rate done something to make that statement possible.

"So much for our aims and objects, a word as to our achievements. I think, perhaps, the great achievement of which we should be proud is the report of our Commission to Germany, I think that but for the existence of our association the compilation of such a document would have been impossible. Had your association not been in the closest possible touch with the Department of Overseas Trade, able to force home your arguments first hand, I do not think it is too much to say tha the information contained in that report would never have been available for every member of your association."

Individuality the Essence of Trade

Dr. E. F. Armstrong, F.R.S. (vice-chairman), in seconding the adoption of the report, said that any one engaged in trade knew that the whole essence of trade was individuality. Quick decisions—courage to make them and to bear the burden of decisions which might involve very serious consequences to the firm—were inevitable if British trade was to retain its old supremacy; indeed, if it was to keep going at all. Such individuality was hopelessly cramped under any system of Government control and Government interference; therefore, it behoved them to fight this throttling influence and retain their individuality. "We all know," he stated, "that we, particularly the smaller firms, should have been hopeless in such a fight; whereas I think we do know and can claim that, as the result of belonging to this association, we have not been placed in that position.. By standing shoulder to shoulder, just as we did in the war, supporting our association and putting the knowledge we have as experts at the service of the whole community, we are bound to win out in the long run.

"I should like to emphasise the work of the information bureau. On the whole, I think the information bureau has not been sufficiently supported. We want to present our facts and figures as an industry—a fair, unprejudiced, unbiassed case—whereas any individual firm is bound to give the case as it affects itself. I urge on all our members that they should give more heed to posting us with exact statistics, so that in time of need we are able to furnish them. It is a very terrible thing, as Mr. Woolcock will tell you, for us to give inaccurate information to the Government. Better give none at all than make a mistake like that. At times he has been at considerable disadvantage because of this haunting fear. It only wants this point driven home once or twice for our members to overcome the difficulty, but it has cropped up more than once during last year, and must be alleviated.

The only other subject passing through my mind at the moment is rather a new phase in British industry—one we should on the whole welcome—that is, the invasion of our

cousins from across the Atlantic into our home industry. I suppose, on the whole, that must be for our good, because we shall be able to learn from them close at hand, and, after all when the other boat begins to get in front of you, then is the time for a sprint to catch it up. The sprint brings out the best that is in us. It allows us to overhaul our machinery, to find out the faulty parts, and replace them by better ones. Possibly the invasion of our friends will be to our good. On the other hand, the British chemical industry is so small in size on the whole, in spite of the 80 million pounds of capital which we record as membership of our association, that there is not very much room for the American invasion to go far. Therefore, it will behove us all rather to overhaul our machinery before the invasion comes than after, so that we may be prepared to meet it and resist. I have the greatest pleasure in seconding the adoption of the report." (Applause.)

Chemical Engineering

In the general discussion which followed, Mr. E. V. Evans, referring to the German mission and its report, said that the question of chemical engineering was one which the association had decided to deal vigorously with, and he was sure that this would serve a most useful end. When they were in Germany there was evidence in every direction that chemical industry there was most wonderfully catered for by the chemical engineering industry, and they were led to the conclusion that the engineer is quite as important a person to chemical industry as is the chemist. They should, therefore, compliment the Council upon the fact that it is intended to analyse and compare the facilities provided by the chemical engineering industry in other countries in relation to the facilities afforded in this country. A committee of the association had been formed to carry out in a preliminary way this investigation as far as it can be done in this country, and also to deal with the question as far as they possibly can of the basic training of engineers to fit them for the chemical industry. This committee was faced with the fact that, just as the British engineer in the shipbuilding industry has attained probably the highest degree of development, so probably in the natural order of things has the chemical engineer in Germany grown with the chemical industry in that country. That does not solve the problem, but it demonstrates at least that the expansion of the chemical industry must go on only when there is a similar expansion in the chemical engineering industry. In this respect the Council was again to be congratulated upon the fact that they have arranged for the formation of an association of Chemical Plant Manufacturers, to be affiliated with this association. He wanted, if possible, to get the interest of the members in this particular question, in order that the association might give careful attention not only to what engineering firms in this country should do in order to foster the chemical industry here, but also perhaps to lay down the basic training that is required for the young men in the future, in order to fit them for the chemical industry and, perhaps above all, for them to be appreciative of and sympathetic towards that peculiar being, the chemist.

Unfair Competition

Mr. E. Bernard Cook referred to the question of imports, and said that to-day the position had come which many foresaw. They were up against unfair competition, which no industry, especially no new industry, could stand up against, on account of exchange—German exchange at 150 and French exchange at 47. The position was now precarious, and the fine chemical industry built up with so much effort during the war was in danger. They believed what had been said that afternoon with regard to adversity, that it brings out the best in us; but if their association were in the position of holding a keen sword, could not that sword be applied to the Government in some way or another, rather than their having to wait for many months.

Mr. F. H. Carr pointed out that the association had by no means been doing nothing in this matter. Such work as was done in restricting imports at the time they were restricted was largely due to the work of the Council of the association. The fact that the Government were checkmated, as they were by the Sankey judgment, left them in the position of having promises from the Government that the fine chemical industry —which had been specifically mentioned as a key industry— would be protected, and the Government policy, as it stood to-day, was that key industries were to be protected. But time had passed from month to month until the situation has become exceedingly acute. There have been answers and reasons why the Government should not get ahead in this matter, a great many other things were taking precedence; and it had been a fact that the Government's anxiety to re-establish exchanges had led them—he believed not ill-advisedly on the whole—to let this matter slide for a little while.

Salicylic Acid Association

Referring to the new Salicylic Acid Association, a combination which was beginning on right lines, Mr. Carr said it was not to be an association to keep prices up, so much as to bring prices down. That is to say, their main object must be essentially to make salicylic acid with such efficiency that they could with certainty place their goods in other countries in which the German can place his goods, at a price equal to or lower than that of the Germans, so that they did not want combinations and price rings for the sake of raising prices or maintaining prices, but for the sake of making England able to lower prices. They had got to sell their products, and fine chemical products more than any other must be sold in a bigger market than England held, if they are going to be manufactured at all. That was a strong reason for further and continual progress on the lines of co-operation. He also spoke on the question of research chemicals.

Mr. Kenneth Chance, speaking from the point of view of an ordinary member of the association, said that the progress that the association had made during the last three or four years was nothing short of amazing. One looked at the papers in the morning, and saw that some new union or federation of one sort or another had been formed. That seemed to be quite impossible in the chemical trade, because the association did its work so extremely thoroughly. He knew that they had founded an affiliated Association of Chemical Plant Manufacturers, but it had often occurred to him how very much they could help one another if from time to time they could have quite private and informal conversations on the various types of plant which were common to so many chemical industries. If a series of meetings could be arranged during the winter, when they could discuss within the privacy of the association's rooms in Piccadilly the trouble they had to deal with in connection with plant, they would really get down to rock bottom, and learn from one another's experience what had actually been found out, for they had each attacked the problems on different lines.

"In conclusion," Mr. Chance said, "I have heard it rumoured that the time has come when a new chairman is going to be elected. That is a matter, of course, which had entirely to do with the Council, but, Mr. Chairman, perhaps I may not be out of order in expressing the hope that from among the many men of brilliant ability on the Council one may be chosen who has the leisure to give to this vastly important purpose as you yourself have given it in the last two years."

Mr. J. Lukes said that the question of transport was one that must be looked after, and it had not been dealt with so thoroughly perhaps in the past as it should have been. There was no comparison between the charges in America and Germany for the carriage of dangerous goods with those of the railway companies in this country. He hoped that the Council would appoint some properly qualified traffic expert who understood railway rates and charges, a permanent official of the association, to whom they might appeal, who would give great satisfaction to the whole of the members. (Applause.)

The chairman briefly replied to the points raised, and the resolution was carried unanimously.

Sir William Pearce, M.P., moved that the present auditors be re-appointed. The expenditure last year was abnormal. It would not be so much next year, though he hoped that would not cut it down to the bone, because the association would cease to perform the mission its members desired it to do if it did not progress in any useful matter that might arise. To show how the association was appreciated by the members, the general manager told him that in the first eight months of their financial year they had already received sufficient members' subscriptions to make their financial path quite secure for the next twelve months. (Applause.)

Mr. Max Muspratt seconded the motion, which was carried unanimously.

Mr. J. W. Wilson, M.P., proposed a hearty vote of thanks to the chairman, which was seconded by Sir John Brunner. The vote of thanks was very heartily accorded, and was acknowledged by the chairman.

From Week to Week

DAMAGE ESTIMATED AT £65,000 was caused by a fire which broke out at a chemical factory near Bordeaux, last week.

LIQUID AMMONIA may now be exported from the Netherlands.

The death is announced of Mr. J. B. WILKINSON, chemical manufacturer, Tong, and vice-president of the Dyers' and Colourists' Association.

DR. T. M. LOWRY, professor of chemistry in the University of London, was elected into the professorship of physical chemistry at Cambridge, on Thursday, July 1.

EDINBURGH UNIVERSITY on Thursday, July 8, awarded the Crum Brown Medal in chemistry to Ralph E. Gibson, and the Vans Dunlop scholarship in chemistry to Christina C. Miller.

A CONSIGNMENT OF 100 TONS OF SUNFLOWER SEED, grown in Southern Rhodesis, has been shipped to England for conversion into oil and cattle cake.

Dr. EDWARDS, professor of metallurgy at Manchester University, and DR. EVANS, lecturer in physics at Manchester University, have been appointed respectively professor of metallurgy and professor of physics at Swansea University College.

BRITISH MOTOR SPIRIT CO.—The Anglo-Texas Oil Co. has declared its first monthly dividend at the rate of 8 per cent. per annum on the preferred shares and 3 per cent. per annum on the ordinary shares, totalling $50,000 a month. The whole of the shares of this company are held by the British Motor Spirit Co.

The British Commercial Commissioner at Berlin has forwarded a translation of the GERMAN REGULATIONS FOR THE REGISTRATION OF TRADE MARKS, dated April 30, 1920. As from July 1 these regulations replace those of December 22, 1905, and November 22, 1898. A copy of the translation of the new regulations can be seen on application to the Enquiry Room, Department of Overseas Trade, 35, Old Queen-street, Westminster, S.W.1.

Details are now available of the scheme for increasing the supply of cotton grown within the British Empire which the EMPIRE COTTON-GROWING COMMITTEE, with the assistance of the Government, proposes to put into force without delay. A voluntary tax on the industry forms an essential part of the plan for providing the necessary funds. The scheme of organisation is being prepared in consultation with the Board of Trade.

The Standing Committee of the House of Commons presided over by Mr. W. G. Nicholson met on Tuesday to consider the DANGEROUS DRUGS BILL. The Bill gives effect to the International Opium Convention, signed at The Hague in 1912. By the Treaty of Versailles Great Britain bound itself to bring the convention into force. The Standing Committee is composed of nearly 60 members, but only 10 were present, and as there was not a quorum the Committee adjourned.

Three months' NOTICE TO TERMINATE THE AGREEMENTS which expire on October 17 next has been given to the Lancashire Allied Dye Trades, the Yorkshire Master Dyers' Committee, the Hebden Bridge Master Dyers, the Middleton Master Dyers and Polishers, and the Bradford Dyers' Association, by the operatives' organisations. The purpose of the notice is to make all claims for alterations in basic wages uniform and to consolidate all cost-of-living wages into one definite wage.

The Council of the SOCIETY OF DYERS AND COLOURISTS announce that, in order to cover the increased cost of production of the *Journal* they are compelled to raise the rates of subscription to 42s. per annum for membership, and 10s. 6d. for junior membership. Owing to the large number of new members, the stock of some issues published during the present year is almost exhausted, and new members will be admitted at a pro rata amount in proportion to the back numbers of the *Journal* published during the year which it is possible to supply when application for membership is made.

Mr. MAXWELL GARNETT, the principal of the Manchester College of Technology, has resigned his post, following upon a vote of censure by the Education Committee. In his letter of resignation, which is addressed to the Mayor, Mr. Garnett complains of the decision of the City Council to admit as whole-time students senior technical schoolboys "who are not qualified to pursue the whole-time courses of study hitherto provided in the college." In his view, this decision will result in serious injury to the highest work of the college. "I am sure," he adds, "you would not wish me to attempt to carry out a policy that I feel to be fundamentally mistaken. This is my reason for deciding to resign."

A serious OUTBREAK OF FIRE occurred in the Royal Technical College, Glasgow, on Saturday. The fire originated in a chemical store on the top floor of the building and at the rear of the centre block. The store, which is divided into two rooms and covers an area of about 30 ft. by 40 ft., is situated between two large laboratories, but owing to the fireproof construction of the building the flames were confined almost entirely to the store, only a small part of the roof of one of the laboratories being involved. The roof of the store was damaged, and the contents, which consisted mainly of chemicals, glassware, and platinum, were completely destroyed. The damage is estimated at £15,000. The origin of the fire has not been ascertained.

The death took place on Thursday, July 10, at Hampstead, of Col. CHARLES E. DUDLEY, managing director of the Anglo-American Oil Co., Ltd. Col. Dudley was an American, and had been identified with the Standard Oil interests, and had taken a prominent part in the extension and development of the Anglo-American Oil Co.'s business for nearly thirty years. He entered the American army in August, 1917, with the rank of captain, and rose to the rank which he held at his death. For his services as head of the Petroleum Section of the army he was awarded a citation by General Pershing for "exceptionally meritorious and conspicuous service." He was also made a Chevalier of the Legion of Honour by the French Government. The funeral took place at Marlborough Place, St. John's Wood, on Monday.

The Salt Trade Ring

THE Board of Trade has issued the report of the sub-committee appointed by the Standing Committee on Trusts to inquire into the existence of a ring in the salt trade, and the effect of any such ring on prices. The sub-committee report that there is in the salt industry a trade combination—viz., the Salt Manufacturers' Association—which fixes, directly or indirectly, the manufacturers' selling prices for 95 per cent. of the salt sold in this country. Except for small retail transactions, the Association fixes at all stages the prices at which most of the salt sold in London is sold. The action of the Association, it is stated, has increased very materially the prices of salt in this country. It has abolished the price cutting which formerly made the salt trade barely remunerative, and has made the trade remunerative to both manufacturers and merchants. While admitting that the dividend paid by the Salt Union for the financial year 1918 on the ordinary shares was equal to only 6 per cent. on their original nominal value, the Committee find that the revenue made in that year from all sources was sufficient to provide, *inter alia*, for the payment of 15 per cent. on the actual ordinary share capital; an addition to reserve of £50,000, equal to 6¼ per cent. on the reduced ordinary share capital; and an expenditure of £100,000 for current repairs and £100,000 for deferred repairs. The prices ruling on December 31, 1919, were such as to give to the Salt Union (together with other trading) similar results, and to give other manufacturers who produce salt more cheaply than the Salt Union a very liberal profit on that commodity, and the Committee are decidedly of opinion that no justification can be shown for any further increase in the prices ruling on December 31, 1919, unless the cost of labour and/or fuel increases. They also think that the possibility of improvement in methods of production should have received more attention than it appears to have received.

Books Received

DICTIONARY OF EXPLOSIVES. By Arthur Marshall. London: J. & A. Churchill. Pp. 159. 15s. net.

THE EXTRA PHARMACOPÆIA OF MARTINDALE AND WESTCOTT. Revised by W. H. Martindale and W. W. Westcott. Seventeenth edition. Vol. I. London: H. R. Lewis & Co., Ltd. Pp. 1115. 27s. net.

Pioneers of British Aviation

Dinner to the Survivors of the First Hundred

AT the Connaught Rooms on Monday evening a distinguished and interesting company assembled at dinner in honour of the survivors of the first hundred British aviators and the pioneers of British aviation. This happy idea was first suggested by Major C. C. Turner, Editor of our contemporary *Aeronautics*, himself the holder of the seventieth pilot's certificate issued by the Royal Aero Club, and well known among airmen as an enterprising balloonist in the early days, and more recently as one who took part in the attempted flight from Cairo to the Cape. Mr. Ernest J. P. Benn, managing director of Benn Brothers, Ltd., the proprietors of *Aeronautics*, warmly approved the idea, and decided in the name of the paper and firm to organise the dinner. The interest in the occasion, however, proved to be so general that the nature of the function had to be enlarged, and ultimately it developed into perhaps the most notable gathering on the personal side yet held in the history of aviation.

The Duke of York was approached and readily consented to attend as the chief guest. With Mr. Benn were also associated the following additional hosts: Major-General Seely, M.P. (who presided), Sir Herbert Austin, M.P., Lieut.-Col. Alan Burgoyne, M.P., Lord Desborough, Sir Robert Hadfield, Lord Montagu of Beaulieu, Sir Charles Wakefield, and Sir Samuel Waring. There was a very large attendance, and the reunion of so many distinguished airmen who were obviously meeting one another after a long interval gave to the dinner an unusual personal interest.

Major-General Seely made an admirable chairman, and the speaking, while very varied in style, maintained a high level of interest. The presence of the Duke of York was particularly welcome, and his speech in responding to the toast of "The Royal Family" was well delivered, and equally happy in its phrases and in its sentiment. The company drank in silence "to the glorious memory of those who laid down their lives to give the Empire her place in the air," and then followed a series of toasts which produced some excellent speaking.

Lord Desborough, an early and loyal friend of aviation, first proposed "The Pioneers of British Aviation," and was followed by Captain Wedgwood Benn, M.P., with one of the cleverest speeches of the evening. The toast was replied to by Lieut.-Col. Moore-Brabazon, M.P., always a most popular after-dinner speaker, and by Major-General Sykes, whose earnest work for aviation everyone recognises. Lord Burnham offered in his cheery way "greetings to our confrères abroad," and two very good speeches followed in reply from the Air Attachés to the French and the United State Embassies, Commander Sablé and Major Melvin Hall respectively.

Two of the most notable contributions came late in the evening from Mr. J. L. Garvin, editor of the *Observer*, and Mr. H. G. Wells. The latter, described as the prophet of aviation, spoke in the typical Wells style and brought the formal speaking to an end on a high note. Lord Montagu of Beaulieu responded and a memorable gathering closed with "God Save the King."

Our congratulations are offered to our popular colleague, Major Turner, on the complete success of the arrangements.

Scientific Glassware Manufacture

AN important development is taking place in Birmingham and the surrounding district in the production of heavy furnace made glassware for scientific work. It includes measuring cylinders, which have to be blown accurately in a mould and afterwards graduated, filter glass, and a variety of complicated apparatus. This output, on which a firm is specialising, is the natural sequence to the creation of the manufacture of light-blown glass for laboratories, and chemical glass, such as beakers and flasks, which was begun immediately after the outbreak of war. There is a fear, however, among manufacturers lest there should be illegitimate competition from abroad, and it is stated that important developments will take place in Birmingham when an assurance is received from the Government that adequate safeguards will be provided against undercutting from abroad. The largest producers of heavy furnace made glassware for laboratory use in this country are ready to install another furnace in Birmingham.

Chemical Matters in Parliament

Nauru Pacific Phosphate Co.

MAJOR BARNES asked the Prime Minister (House of Commons, July 8) if a valuation was made of the interests of the Pacific Phosphate Co.; if so, by whom; and if he would circulate a Memorandum giving the particulars of the valuation before the Report stage was taken?

Lieut.-Colonel Amery: No exact valuation was possible, as the future price of the phosphates, which constitute the bulk of the company's assets, is necessarily conjectural. Having regard to the past profits of the company, and to their future prospects, as represented by the market value of their shares, the amount demanded for the surrender of their interests can only be regarded as moderate.

Major Barnes asked (House of Commons, July 12) what the profits of the Pacific Phosphates Co. were for the three years preceding their purchase by the associated Governments; what was the market value of their shares on the date of the agreement to purchase; what was the authorised capital of the company; and if he would give the names of the directors?

Lieut.-Colonel Amery: Owing to the short notice given I am unable to supply the particulars asked for in the first two parts of the question, but I will ascertain them. The authorised capital is £1,200,000. The names of the directors are Lord Balfour of Burleigh, Lord Southborough, Messrs. B. T. Balding, G. W. H. Bowen, A. R. Dickenson, G. W. Fox, W. R. Hay, A. N. Rickett, H. Voss.

Mr. Ormsby-Gore asked what compensation, if any, was payable to the directors of the Pacific Phosphates Co. under the purchase by the British, Australian and New Zealand Governments by the Nauru Island agreement?

Lieut.-Colonel Amery: The Governments are under no liability for such compensation. It is a matter for the company to deal with.

Oil Contract

Lieut.-Colonel Croft asked the Under-Secretary of State for Foreign Affairs (House of Commons, July 12) whether, just prior to the War, a British firm obtained a concession for exploring oil in Colombia; whether after the concession was obtained the United States Government made representations that they did not view this concession with favour; and whether the Foreign Office advised the firm to forego the concession in deference to the views of the United States?

Mr. Kellaway: An oil contract was concluded between the Colombian Government and a British firm in 1913, but the firm in question ultimately withdrew from the contract owing to the impossibility of obtaining its approval by the Colombian Congress. The second and third parts of the question do not therefore arise.

Mesopotamia Oil

Mr. Kellaway, in reply to Mr. C. White (House of Commons, July 12), said that there was no director of the Anglo-Persian Oil Co. who was also a director of the Turkish Petroleum Co.

Motor Fuel (Alcohol)

In reply to Mr. Newbould (House of Commons, July 12), who asked whether it was proposed to take action in accordance with the recommendations of the Committee which investigated the price of petroleum, Sir R. Horne said the recommendations of the Sub-Committee on Motor Fuel, under the Profiteering Act, had been very fully considered, but it was not found practicable to take any action on them except so far as concerned power alcohol. The question of alcohol was being investigated by an officer attached to the Fuel Research Board, and provisions relating to it were contained in the Finance Bill.

Iron Foundry Practice and Research

LORD WEIR has accepted the position of president designate of the proposed Research Association for the gray and malleable cast iron trades, and on July 22 its inauguration will take place at Birmingham. The vice-presidents are to be Sir Robert Hadfield and Dr. J. E. Stead, and the hope is entertained that Mr. George Pate, the manager of the Carron Company, may be secured as chairman. The headquarters of the Association will be in Birmingham; and Mr. T. Vickers, of Erdington, Birmingham, is the secretary. Laboratories will be established as well as a Bureau of Information.

References to Current Literature

British

ANALYSIS. Rapid volumetric method for estimation of iron, applicable in presence of hydrochloric acid, phosphorus, oxy-acids and organic matter. H. D. Richmond. *Analyst*, July, 258-260. The method is specially suitable for the analysis of pharmaceutical preparations containing iron.

Estimation of nitroglycerin. H. D. Richmond. *Analyst*, July, 260-266. A method suitable for pharmaceutical preparations containing nitroglycerin is described.

CELLULOSE. Catalytic action in the oxidation of cellulose. L. P. Wilson. *J. Soc. Chem. Ind.*, July 15, 177T. The effect of catalysts on the oxidation of alkali-cellulose in the production of viscose artificial silk is discussed.

DRYING. The deliquescence and drying of ammonium and alkali nitrates and a theory of the absorption of water vapour by mixed salts. E. B. R. Prideaux. *J. Soc. Chem. Ind.*, July 15, 182-185T.

FRACTIONAL DISTILLATION. The rectified petroleum spirit from the toluene-petrol fraction of Borneo petroleum, with a note on laboratory fractionating columns. W. A. Silvester. *J. Soc. Chem. Ind.*, July 15, 187-188T.

LUBRICATION. The effect of the addition of certain fatty acids on the interfacial tension between B.P. paraffin oil and mercury. S. S. Bhatnagar and W. E. Garner. *J. Soc. Chem. Ind.*, July 15, 185-187T.

ORGANIC CHEMICALS. The production and supply of synthetic organic chemicals in the United States. H. T. Clarke and C. E. K. Mees. *J. Soc. Chem. Ind.*, July 15, 230-233R. A description of the scheme devised in conjunction with universities and manufacturers for the preparation of organic chemicals in the laboratory of the Eastman Kodak Co.

PIGMENTS. The detection of natural barytes in lithopone, &c. S. Stewart. *J. Soc. Chem. Ind.*, July 15, 188T. A microscopical test is described.

SEWAGE SLUDGE. The fertilising value of sewage sludges. W. E. Brenchley and E. H. Richards. *J. Soc. Chem. Ind.*, July 15, 177-182T. A comparison of the fertilising value of activated sludge, slate-bed sludge, and pressed cake from precipitation tanks.

Colonial

ANALYSIS. Estimation of iron and separation of manganese from iron by cupferron (nitrosophenyl hydroxylamine-ammonium). E. H. Archibald and R. V. Fulton. *Trans. Roy. Soc., Canada*, Vol. 13, Sect. III., 243-253.

BALLOON FABRICS. Permeability of balloon fabrics to hydrogen and helium. R. T. Elworthy and V. F. Murray. *Trans. Roy. Soc. Canada*, Vol. 13, Sect. III., 37-46.

HELIUM. Combustibility of mixtures of hydrogen and helium. J. Satterly and E. F. Burton. *Trans. Roy. Soc. Canada*, Vol. 13, Sect. III., 211-216.

Continuous flow apparatus for purification of impure helium mixtures. E. Edwards and R. T. Elworthy. *Trans. Roy. Soc. Canada*, Vol. 13, Sect. III., 47-52. The impurities are absorbed by charcoal at liquid air temperature.

LIGNITE. Adsorption of gases by carbonised lignites. S. McLean. *Trans. Roy. Soc. Canada*, Vol. 13, Sect. III., 187-196. Experiments on the adsorption of carbon dioxide, hydrogen, nitrogen and oxygen are described.

French

ANALYSIS. Determination of small quantities of phosphoric acid as barium phosphomolybdate in presence or absence of organic phosphorus compounds. S. Posternak. *Bull. Soc. Chim.*, June 30, 507-518.

CHLORIDES. Production of chlorides by reactions started by a primer. E. Berger. *Comptes rend.*, July 5, 29-32. The preparation of metallic chlorides by a method analogous to the thermal process is described especially in connection with production of artificial smoke clouds.

COAL. Oxidation of coal. M. Godchot. *Comptes rend.*, July 5, 32-34. Experiments on the oxidation of coal extracted with pyridine and of the pyridine extract are described.

SEWAGE. Purification of sewage by activated sludges. R. Cambier. *Comptes rend.*, July 5, 57-60. Experiments are described which point to a connection between the presence of iron sulphide and nitrifying and purifying action of the sludge.

TARTRATES. The compounds of tartaric acid with antimony. A. Blanchetiere. *Bull. Soc. Chim.*, June 20, 477-490. Describes compounds obtained by the action of antimonious oxide on tartaric acid.

United States

ANALYSIS. Comparison of ten different methods of estimating calcium. G. E. Ewe. *Amer. J. Pharm.*, June, 401-409.

CORROSION. Tests for relative corrosion. B. Feuer. *Chem. & Met. Eng.*, June 30, 1197-1198. Results of tests with brasses and bronzes by the solution potential method are given.

ELECTRICAL PRECIPITATION. The motion of droplets and particles in the field of the corona discharge. R. C. Tolman and S. Karrer. *Chem. & Met. Eng.*, June 30, 1203-1206. The corona discharge is shown to be largely responsible for the action of Cottrell precipitators.

FILTRATION. Scientific control of the filter station. A. Wright. *Chem. & Met. Eng.*, June 30, 1201-1202. Deals with different types of filter-presses and their operation. (*See also* THE CHEMICAL AGE, II., 697, III., 14, 41.)

METALS. Lead and zinc industry in Japan. *Chem. & Met. Eng.*, June 30, 1198-1200.

NITRATES. Economic aspects of Chilean nitrate industry. *Chem. & Met. Eng.*, June 30, 1207-1211.

OXALATES. Factors in conversion of sodium formate into oxalate. E. H. Leslie and C. D. Carpenter. *Chem. & Met. Eng.*, June 30, 1195-1197. Best conditions are: addition of 1 per cent. of sodium hydroxide, temperature 350°C., pressure 14 in. mercury.

PYROMETERS. Calibration of an optical pyrometer. W. E. Forsythe. *Chem. & Met. Eng.*, June 30, 1211-1213.

TECHNICAL MATERIALS. Review of papers presented at meeting of American Society for Testing Materials, June 22-25. *Chem. & Met. Eng.*, June 30, 1189-1192. Includes papers on: Corrosion of Sheet Metal (report of committee); Steel Rails (J. E. Howard); Molybdenum Steels (G. W. Sargent); Nomenclature of non-ferrous alloys (report of committee); Effect of tin on brasses (W. Campbell); Testing of galvanised coatings (A. S. Cushman); Hiding power of paints (R. L. Hallett); Colorimeter for white paints (A. H. Pynud); Plastometer (H. Green).

German

ANALYSIS. Application of conductimetric titrations in neutralisation analysis. III. Titration of combined weak acids or bases in salts. I. M. Kolthoff. *Z. Anorg. Chem.*, July 1, 97-108. (*See also* THE CHEMICAL AGE, II., 641.)

Determination of glycol. B. Müller. *Chem.-Zeit.*, July 10, 513-515. Deals with analysis of glycerin substitutes.

Determination of methyl alcohol. A. Heiduschka and L. Wolf. *Pharm. Zeutralh.*, July 1, 361.

Determination of tungsten, molybdenum and vanadium in ferro-alloys. *Stahl u. Eisen*, June 24, 857-858. Methods recommended by Chemikerausschuss des Vereins deutscher Eisenhüttenleute.

Estimation of sulphuric acid. L. W. Winkler. *Z. anger. Chem.*, June 29, 159-160, July 6, 162-163. Deals with corrections for use in gravimetric estimatuer as barium sulphate.

ZINC AND CADMIUM. Experimental determination of vapour pressure curves of liquid cadmium and zinc and calculation of chemical constants of cadmium, zinc, and monatomic bromine. H. Braune. *Z. anorg. Chem.*, July 1, 109-147.

Miscellaneous

ANALYSIS. Estimation of carbide carbon in steel. K. Inouye. *J. Coll. Eng., Tokyo Imp. Univ.*, Vol. 10, No. 6, March 30.

ELECTRICAL CONDUCTIVITY. Electrical conductivity of mixtures of salts in the molten and solid states. C. Sandonnini. *Gaz. Chim. Ital.*, May, 289-321.

IRON. Growth of cast iron. M. Okóchi and N. Satô. *J. Coll. Eng., Tokyo Imp. Univ.*, Vol. 10, No. 3, February 29. The permanent expansion of grey cast iron after repeated heating is attributed to pressure of occluded gases.

Patent Literature

Abstracts of Complete Specifications

144,336. DYES, PRODUCTION OF WATER-SOLUBLE. A. M. Hart, 18, Hilltop Road, Hampstead, London, N.W. 3. Application date, December 13, 1918.

The object is to produce water-soluble dyes from animal and vegetable dyeing material, and to avoid the difficulty that dyes extracted with organic solvents are not usually very soluble in water. The raw material—*e.g.*, Brazil wood, sanderswood, logwood, turmeric or cochineal—is dried, ground to as fine a powder as possible, and then extracted with a suitable organic solvent such as alcohol, acetone, amyl acetate, or pyridine, under reduced pressure and with the application of heat. The mixture is filtered under pressure in a filter press, the filtrate concentrated, and the solvent recovered in any known way. The concentration is preferably effected under reduced pressure and continued till the solution is viscous. The extract is mixed with a water-soluble metallic salt or solid organic acid, such as alum, aluminium acetate, potassium ferricyanide and bichromate, stannous chloride, ferric acetate, copper sulphate, cream of tartar, and tartaric, citric, or oxalic acid, but not including alkali sulphides or polysulphides. The mixture is fused by heat and is then pulverised. The product is soluble in water, giving a strong dye solution. Examples are given of the treatment of cudbear, cochineal, turmeric, logwood and madder. Different colours may be obtained from the same raw material by treatment with different solvents and fluxes. Different solvents may sometimes be employed in sequence.

144,359. POROUS REFRACTORY MATERIALS, MANUFACTURE OF. L. Denis, 6, Quai de l'Industrie, Liège, Belgium. Application date, March 5, 1919.

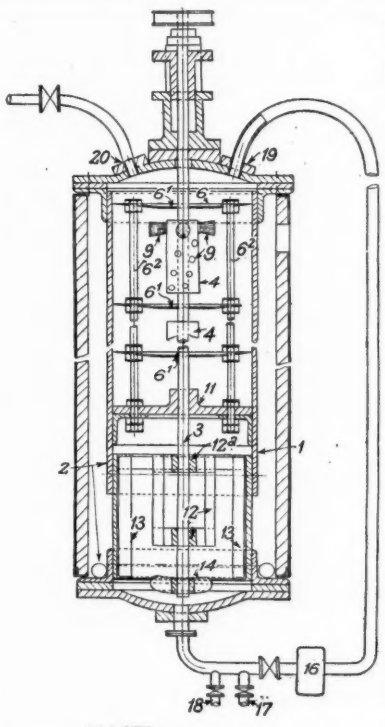
A porous refractory material capable of withstanding temperatures up to 2,000°C., and suitable for use in surface combustion, apparatus is produced from a mixture of rich refractory earth containing 70 to 80 per cent. of sand 30 parts, magnesia 30 parts, poor earth containing more than 80 per cent. of sand 25 parts, and sawdust 5 parts. The mixture is heated to at least the temperature which it will be required to withstand in use, and the sawdust produces the gases necessary to form the minute spaces within the material which give it the desired porosity.

144,398. CYANOGEN FROM COAL GAS, RECOVERY OF. J. J. Hood, 4, Canonbury Park North, London. Application date, March 14, 1919.

Cyanogen is usually present in coal gas in the form of ammonium sulphocyanide, and this substance is also continuously being formed in the gas during its passage through the purifiers by the action of carbon bi-sulphide on ammonia, sulphuretted hydrogen being also liberated. The sulphocyanide may be recovered by washing the gas with a solution of salts of iron in a scrubber, but the object of the process is to recover the cyanogen without the use of a special scrubber, and without the loss of a portion which usually occurs with the scrubber containing iron salts. A purifier containing slaked lime is used, and the last tier next the exit is impregnated with a solution of an iron salt preferably ferrous sulphate, whereby hydrated iron oxide is precipitated and mixed with the excess of lime. When coal gas is passed through, the three acidic bodies HCN, CO_2 and H_2S are at first absorbed, but after a time the carbon dioxide displaces the sulphuretted hydrogen and hydrogen cyanide, which pass forward, and the hydrogen cyanide is finally displaced by the sulphuretted hydrogen. The displaced hydrogen cyanide is absorbed and fixed by the tier of lime and hydrated iron oxide, the quantity of carbon dioxide and sulphuretted hydrogen being then at a minimum. The spent lime is subsequently removed and leached with a dilute solution of sodium carbonate to produce an alkali cyanide.

144,478. HYDROGENISING OILS AND FATS, APPARATUS FOR. Blair, Campbell & McLean, Ltd., D. A. Blair and J. L. Ferguson, Woodville Street, Govan, Glasgow. Application date, June 28, 1919.

The apparatus is for converting oil or fat into a compound such as stearine by hydrogenation with the aid of a catalyst. A strong steel cylinder 1 is heated by means of a steam jacket or furnace flue 2, and is provided with a central vertical shaft 3, carrying buckets 4. Each bucket is open at the top, and is provided with a number of diverging radial brushes 9 fixed in openings in the side walls and projecting outwards. A fixed horizontal plate 11 carries vertical rods 6^2, which support a number of horizontal annular dish-shaped plates 6, which are arranged alternately with the buckets 4. The shaft 3 also carries a stirring device, consisting of bosses 12^a, carrying vertical blades 12, and angle irons 13 are fixed on the inside of the vessel to prevent bodily rotation of the oil. Another stirring device 14 prevents settling of the catalyst at the bottom of the vessel 1. The oil and catalyst are supplied through a branch pipe 17 and the hydrogen through a pipe 18, and the oil is circulated by a pump 16 upwards through an external pipe to an inlet 19. The oil flows inwards over the plate 6 to its central opening 6′, and then falls on to the rotating brushes 9, from which it is thrown in a very fine spray. The liquid is then diverted by the plate 6 next below into the next bucket from which it is again sprayed, and so on. The oil is thus brought into intimate contact with the hydrogen, and the circulation is continued until hydrogenation is complete. A vacuum may be maintained in the vessel 1 by means of a vacuum pump connected to the opening 20.



144,478

144,520. GAS PRODUCER. J. F. Wells, 36, Sharia Falaki, Cairo. Application date, September 1, 1919.

A vertical producer chamber is surrounded by a water jacket which supplies the steam necessary for the generation of gas. The air supply for the producer is derived from a steam or compressed air injector arranged near the top of the producer and the air passes downwards through a vertical pipe to a pair of parallel horizontal pipes one on either side of the water jacket near the bottom. The air then passes into the bottom of the producer through a series of short transverse tubes passing through the water-jacket. The space above the water in the jacket is connected with the injector chamber, so that the steam generated is drawn in with the air. In order to start the producer, the vertical air supply pipe is closed by a valve and the horizontal air pipes are connected to the delivery end of a fan. A feed hopper is provided at the top of the producer chamber, and ash is discharged by a helical conveyor at the bottom.

144,561. FILTERS. E. S. Arrighi, 39, 40, Bond Street, Brighton. Application date, December 8, 1919.

A pouring funnel of the ordinary conical type is provided with an inner concentric funnel, preferably of glass, and flanged at the top so as to rest on the rim of the outer funnel; the inner funnel is shorter than the conical portion of outer funnel, and its walls are parallel and close to the latter. A filtering fabric is placed over the top of the pouring funnel, and the inner funnel then pressed into position over the fabric, so that the latter is gripped between the upper edges of the two funnels, and its lower portion forms a pocket depending below the lower edge of the inner funnel.

NOTE.—The following specifications which are now accepted were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention: 127,566 (E. Bergve), relating to the decomposition of alkali alumino silicates, *see* Vol. I., page 229; 138,078 (G. Bonwitt), relating to the manufacture of dissolved or gelatinised cellulose esters, *see* Vol. II., page 362; 138,099 and 138,329 (Vereinigte Chemische Werke Akt.-Ges.), relating to the manufacture of glycerol from sugar, *see* Vol. II., pages 362 and 386 respectively.

International Specifications Not Yet Accepted

142,441. COPPER AND ITS ALLOYS. A. Strasser, 5, Blumenstrasse, Rorschach, Switzerland. International Convention date, April 26, 1919.

The object is to deoxidise and refine copper or a copper alloy. The metal is melted and a copper cartridge containing potassium phosphide is added: silicon and arsenic compounds and protoxide of copper are thereby converted into phosphorous compounds. The temperature is then raised and the phosphorous compounds are decomposed by adding another copper cartridge containing one of the alkali earth metals or lithium. The resulting oxides formed float on the surface of the molten copper.

142,443. COKING. International Coal Products Corporation, 24, Broad Street, New York (Assignees of W. Runge, 68, Hillyer Street, Orange, N.J., U.S.A.). International Convention date, April 30, 1919.

Lignite is mixed with 10 to 15 per cent. of pitch and partly coked in a continuous retort at 800°-900°F. The mixture is then crushed, and again mixed with pitch and with a flux, and finally briquetted. The briquettes are then coked at 1,400°-1,850°F.

142,448. MONOAZO AND PRIMARY DIAZO DYES. Ges. für Chemische Industrie in Basel, 141, Klybeckstrasse, Basle, Switzerland. International Convention date, May 1, 1919.

One or two molecular parts of a diazotized *o*-aminooxyarylsulphonamide having the formula—

$$(OH)(NH_2)R-SO_2NHX,$$

where R = aryl or substituted aryl and X = hydrogen or aryl, are coupled with one molecular part of an N-substituted derivative of 2 : 5 : 7-aminonaphthol sulphonic acid. The diazo compound first mentioned may be replaced in part by any aromatic *o*-oxydiazo compound. Suitable derivatives of 2 : 5 : 7-aminonaphthol sulphonic acid are phenyl-2 : 5 : 7-acid, benzoyl-2 : 5 : 7-acid, *m*-aminobenzoyl-2 : 5 : 7-acid, the urea of 2 : 5 : 7-acid, 5 : 5′-dioxy-2 : 2′-dinaphthylamine-7 : 7′-disulphonic acid, or the urea of *m*-aminobenzoyl-2 : 5 : 7-acid. The resulting dyes are substantive cotton dyes. They may be converted in substance into copper compounds by treating their solutions with copper or copper compounds, or by effecting the coupling in the presence of copper or copper compounds. Alternatively, the fibre may be subsequently treated with copper salts, or the dyeing or printing may be effected in the presence of a copper salt. Some examples are given of the method of preparing a monoazo dye from 6-nitro-2-amino-1-oxybenzene-4-sulphonamide and phenyl-2 : 5 : 7-acid; and of preparing disazo dyes from (1) two molecular parts of 2 : amino-1-oxybenzene-4-sulphonamide and 5 : 5′-dioxy-2 : 2′-dinaphthylamine-7-7′-disulphonic acid; (2) two molecular parts of 2-amino-1-oxybenzene-4-sulphonamide and the urea of 2 : 5 : 7-acid; (3) two molecular parts of 2 : amino-1-oxybenzene-4-sulphonanilide and the urea of 2 : 5 : 7-acid; (3) 2 : amino-1-oxybenzene-4-sulphonamide, 2-amino-1-oxybenzene-4-sulphonic acid, and 5 : 5′-dioxy-2 : 2′-dinaphthylamine-7-7′-disulphonic acid. The copper compounds of the dyes in substance and on the fibre are also described.

142,480. GLUCOSE, ALCOHOL, &C., FROM MATERIALS CONTAINING CELLULOSE. A. Classen, 57, Remplergraben, Aachen, Germany. International Convention date, March 18, 1919.

A higher yield of furfurol, methyl alcohol, and glucose may be obtained by adding in addition to the acid required for the conversion purpose, a small quantity of hydrochloric, sulphonic, sulphurous, or hydrofluoric acid, or acid salts, or other salts decomposed by excess of acid or hydrolytically, such as magnesium, calcium, aluminium, zinc or manganese chlorides. If the conversion agent is hydrochloric acid, the catalyst is preferably a mixture of sulphuric and sulphurous acids. The material is mixed with 50-100 per cent. of water to prevent the formation of non-fermentable sugars, and subjected to a preliminary treatment with steam in an autoclave, the vapour being removed. The conversion acid is then added in sufficient quantity to permit the subsequent disintegration of the treated material, and the pressure is raised to 7-8 atmospheres. A lower pressure may be employed if "protective" substances such as metallic oxides are also added. When conversion is complete, the mixture is evacuated into a cooling chamber, where it is rapidly cooled and the furfurol is condensed. The residue is subjected to suction or to steam treatment to remove any futher quantity of furfurol or methyl alcohol, and a sugar solution is obtained by lixiviating the residue.

142,477. ABSORPTION APPARATUS. G. Nauerz, Baus-Rouk, near St. Martin-du-Var, Alpes Maritimes, France. International Convention date, April 30, 1919.

The apparatus is for absorbing gases such as gaseous acids in liquids. The gas passes into the lower part of the apparatus through an inlet *r*, and then upwards through short tubes *i* mounted in horizontal partitions. Each tube *i* is covered by a small bell *h*, having openings *j*, through which the gas passes at a regulated depth into the liquid in thecompartments. The absorbing liquor is admitted through an opening *v* at the top and flows downwards through the apparatus, being maintained at a constant depth in each compartment, *c*, c_1, c_2, by overflow pipes *m*, *n*, *o*, projecting upwards to the required height. The unabsorbed gas is withdrawn through the outlet *u*. Volatile products may be distilled by heating the lower compartments and condensing the distillate in the upper compartments, or, if necessary, the vapour distillate may be withdrawn from the apparatus and condensed separately.

FIG 1.

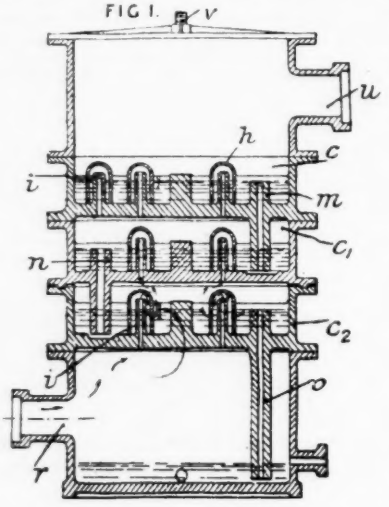
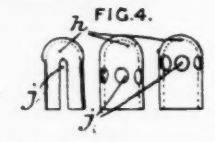


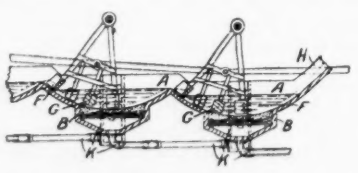
FIG.4.



142,477

142,493. LIXIVIATING APPARATUS. G. Grondal, Djursholm, Sweden. International Convention date, April 29, 1919.

The apparatus is for lixiviating roasted ore with acid. A series of vats A are arranged in stepped formation, and water is supplied to the uppermost vat, and acid to one of the intermediate vats. Each vat is provided with a filter B at the bottom, the lower sides of the filters being connected by pipes K to the upper side of the filter in the vat next below in the series. The ore is fed by a shoot H to the lowermost vat, and is fed in succession through the other vats in counter current to the flow of acid by means of oscillating, feeding and stirring



142,493

members F, G. If desired, the filter B may be omitted from all the vats except the lowest. The solution is finally drawn off from the lowest vat.

142,507. FATTY ACIDS, &C., FROM PARAFFIN WAX. A. Schmidt, Troisdorf, near Cologne, Germany. International Convention date, January 15, 1916.

Air or oxygen is blown for a long period through melted paraffin wax at a temperature of 100°-120°C., when oleic and other fatty acids, resin acids, ceresin, spirits of resin, alcohols and aldehydes are formed. After about 70 per cent. of the wax has been converted, the mixture becomes a deep yellow, and the process is then stopped. The process is facilitated by the addition of a catalyst such as mercuric oxide, or paraffin wax, which has already been treated as above.

142,512-3. REFRACTORY SUBSTANCES. G. L. Dimitri, 7, Rue Victor Considerant, Paris, and J. E. Delaunay, 9, Rue Clodion, Paris. International Convention dates, November 21, 1916, and July 16, 1918.

142,512. Talc, steatite, Briancon chalk or other natural magnesium silicate is produced and mixed with feldspar, mica, pyrozene or the like, or with rocks such as granite gneiss, porphyry or pegmatite. The mixture may be prepared moist, and is then dried, moulded and burnt at about 1,450°C. The product is refractory and an electric insulator.

142,513. An apparatus is described whereby the mixture described above may be moulded or compressed in a vacuum. The mixture is placed in a vertical cylinder which is closed by an airtight piston at the bottom and by a cover at the top, having a small passage through which air may be exhausted. A loose-fitting disc rests on the surface of the material to prevent suction of the powder into the tube through which the air is exhausted.

LATEST NOTIFICATIONS.

146,092. Cellulose esters. Soc. Chimiques des Usines du Rhône. June 20, 1919.

146,097. Solid neutral fertiliser containing nitrogen and phosphorus. Nitrum Akt.-Ges., and Schellenberg, H. June 28, 1919.

146,108. Ferro-tungsten, Process for the elimination of impurities. McKenna, P.M. August 11, 1916.

146,110 and 146,114. Methane. Farbwerke vorm. Meister, Lucius & Bruning. June 28, 1919, July 1, 1919.

146,126. Heating device in electrical resistance furnaces. Allgemeine Ges. für Chemische Industrie. March 13, 1919.

146,127. Operations at high temperatures in an air-free space, Process and apparatus for. Allgemeine Ges. für Chemische Industrie. March 13, 1919.

146,289. Cyanamide derivatives of alpha-halogenated acids, Manufacture of. Farbenfabriken vorm. F. Bayer & Co. November 22, 1915.

146,141. Sulphur from hydrogen sulphide or from gases containing it, or for purifying said gases, Process for obtaining. Farbenfabriken vorm. F. Bayer & Co. May 24, 1917.

146,145. Gases containing hydrogen sulphide, Process for treating or purifying. Farbenfabriken vorm. F. Bayer & Co. July 3, 1918.

146,159. Phenolic condensation products, Manufacture of. Redman, L. V., Weith, A. J., and Brock, F. P. June 6, 1918.

145,709 and 145,710. Low carbon ferro-chromium, Process for producing. Krupp Akt.-Ges., F. July 27, 1916, October 3, 1916.

145,711. Low carbon and low silicium ferro-chromium, Process for producing. Krupp Akt.-Ges., F. January 11, 1918.

17,435. Cellulose ester compositions. British Cellulose & Chemical Manufacturing Co. June 30, 1919.

146,227. Oxides of nitrogen from ammonia. Frischer, H. November 23, 1916.

146,259. Artificial fertilisers, Manufacture of. Akt.-Ges. für Anilin Fabrikation. January 29, 1918.

145,581. Oxyarylaldehydes, Manufacture of. Akt.-Ges. für Anilin Fabrikation. February 6, 1918.

145,582. Artificial fertilisers, Manufacture of. Akt.-Ges. für Anilin Fabrikation. March 16, 1918.

145,610 and 145,611. Cellulose and manufactures therefrom, Treatment of. Moeller, F. August 22, 1918, and February 24, 1919.

145,614. Derivatives of p-amino-phenol and of its O-alkyl ethers, Manufacture of. Kolshorn, E. June 13, 1919.

145,674. Dye vats, Preparation of. Bennert, C. December 24, 1915.

145,696. Ammonium sulphate from cyanogen compounds produced in the distillation of coal or organic substances, Process for producing. Collin Akt.-Ges. zur Verwertung von Brennstoffen und Metallen, F. J. May 17, 1919.

145,743. Alkyl anilines, Production of. Du Pont de Nemours & Co., E. I. July 7, 1917.

145,781. Discharging ammonium sulphate from saturation baths, Method of. Collin Akt.-Ges. zur Verwertung von Brennstoffen und Metallen, J. F. April 2, 1919.

145,802. Dyestuffs of the acridine series, Manufacture of. Akt.-Ges. für Anilin Fabrikation. April 22, 1915.

Patents Court Cases

The British Dyestuffs Corporation, Ltd., of 70, Spring Gardens, Manchester, have applied for the grant of compulsory licenses in respect of the following patents: 5,122, dated March 2, 1907, to O. Imray (from Society of Chemical Industry in Basle) for "Manufacture of halogen derivatives of indigo and leuco-compounds thereof"; 6,490, dated March 18, 1907, to O. Imray (from Society of Chemical Industry in Basle) for "Manufacture of halogenised vat dyestuffs and derivatives thereof"; 344, dated January 16, 1907, to Basler Chemische Fabrik for "Manufacture of a new red vat dyestuff." Any notice of opposition to the grant of these licenses must be given not later than July 28, 1920.

Specifications Accepted, with Date of Application

145,099. Carbon Bisulphide, Extraction and Recovery of. H. G. Colman and E. W. Yeoman. December 20, 1918.

145,101. Carbonaceous material, Apparatus for distilling. W. P. Perry. January 20, 1919.

145,128. Celluloid, vulcanite, or the like, Production of substitutes for. W. T. Robinson-Bindley, A. W. Weller and E. Dulcken. March 21, 1919. Addition to 134,564.

145,136. Gas-Producers. J. Harger. March 22, 1919.

145,159. Mills or machines for grinding or pulverising ore and other materials. R. Hush. March 26, 1919.

145,164. Gas-Producers. W. Antrobus. March 29, 1919.

145,198. Hydrocarbons, Treatment of. G. F. Forwood and J. G. Taplay. April 16, 1919.

145,230. Mixing and/or agitating machines. Brinjes & Goodwin and H. P. Harris. May 23, 1919.

145,297. Classifying and concentrating apparatus for minerals and the like. W. W. Richardson. August 11, 1919. Addition to 12,502/19.

145,299. Nitrogen products, Apparatus for the production of. C. T. Thorssell and H. L. R. Lunden. August 14, 1919.

145,366. Spent iron oxide, Furnace or kiln for burning. W. Crowther. January 9, 1920.

Applications for Patents

Akt.-Ges für Brennstoffvergasing. Treatment of coking coals for extraction of nitrogen. 20,164. July 9. (Germany, November 17, 1916.)

Bergius, F. Production of ethylene chloride. 19,963. July 9. (Germany, February 29, 1916.)

British Dyestuffs Corporation. Manufacture of phthalic acid and phthalic anhydride, and of catalyst for use therein. 19,210. July 7.

Bucherer, H. Production of derivatives of condensation products of formaldehyde and phenols. 20,041. July 9. (Germany, June 10, 1918.)

" Production of derivatives of condensation products of aldehydes and phenols. 20,286. July 9. (Germany, March 22, 1919.)

Casella & Co., L. Manufacture of vat dye-stuffs. 19,693. July 8. (Germany, July 4, 1918.)

" Manufacture of vat dye-stuffs. 19,694. July 8. (Germany, March 24, 1919.)

" Manufacture of a colour of the anthraquinone series. 20,256. July 9. (Germany, March 15, 1915.)

Chemische Fabrik Rhenania Akt.-Ges. Manufacture of nitrogen containing additions and condensation products from acetylene and ammonia. 19,039. July 6. (Germany, November 20, 1913.)

" Manufacture of manures. 20,170. July 9. (Germany, May 31, 1918.)

" Nitric-acid superphosphate. 20,171. July 9. (Germany, April 12, 1919.)

Chemische Fabriken Worms Akt.-Ges. Manufacture of tanning agents. 20,027. July 9. (Germany, July 20, 1918.)

Elektro-Osmose Akt.-Ges. (Graf Schmerin Ges.) Process for purifying glycerine, &c. 18,752. July 5. (Germany, January 17, 1919.)

Ellis, G. B. (*Soc. Chimique des Usines du Rhone, anciennement Gilliard, P. Monnet et Cartier.*) Manufacture of oxyaldehydes, &c. 19,208. July 7.

Farbwerke vorm. Meister, Lucius, & Brüning. Process of producing white and coloured discharges on coloured grounds. 18,757. July 5. (Germany, July 8, 1919.)

" Manufacture of pyridine bases. 18,758. July 5. (Germany, June 22, 1917.)

" Manufacture of arseno-compounds of the pyrazolone series. 18,759. July 5. (Germany, December 15, 1917.)

" Manufacture of mono-azo dye-stuffs for wool. 18,760. July 5. (Germany, June 30, 1914.)

Monthly Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

British Market Report

WEDNESDAY, July 14.

There is very little change to report in the market during the current week, the turnover remains on the quiet side, but values show little change and the general tendency is quite healthy. Opinion generally inclines to the view that it would not be surprising to see a general revival in the course of the next few days.

There is a moderate business passing on export account, but as already reported on several occasions it is strictly limited by the shortage of supplies. There is a certain amount of competition from America, but in the majority of cases prices quoted are only fractionally lower than current prices quoted from England.

General Chemicals

ACETONE is in normal demand without change in value.

ACETIC ACID.—The arrivals from abroad show considerable diminution, the price remains firm and any increase in demand will no doubt induce higher prices.

ACID CARBOLIC is rather easier and trade is only on the light side.

ACID CITRIC remains a featureless market and sellers are rather inclined to make concessions to obtain business.

ACID OXALIC is rather easier in price owing to the arrival of a few parcels from abroad, the market is on the small side, but the undertone is quite firm and manufacturers hold to their prices.

ACID TARTARIC would appear to have found its level for the time being and only a moderate business is reported.

AMMONIUM SALTS remain in good demand, but one or two parcels of Muriate are offered in second hands at below the makers' quotations. It is difficult, however, to see and hope for any substantial reduction at present.

ARSENIC.—Cornish make is again firmer, but there is no change to report in the position as far as foreign supplies are concerned.

BARIUM SALTS are only in quiet enquiry, with Chloride again easier and this article is again being offered from abroad.

COPPER SULPHATE is exceedingly weak and the business passing is quite normal.

FORMALDEHYDE remains a firm market and spot supplies are difficult to secure.

LEAD SALTS are rather firmer in price in sympathy with the improvement in the metal, but the demand has not improved a great deal. It is quite certain that with any increase in business present values which can only be described as distinctly moderate will quickly respond.

LITHOPONE is quietly steady at recent values.

POTASSIUM PERMANGANATE.—The largest supplies on the market have had the effect of temporarily easing the price and the article is only in quiet demand.

POTASSIUM PRUSSIATE.—Very little is offering for prompt delivery, and there are only one or two parcels of foreign make offered at current rates to arrive; the market in Germany, however, is again higher in price.

SODIUM ACETATE is quietly steady with little business passing.

SODIUM BICHROMATE is only a quiet market and odd parcels can be obtained at under the current rate.

SODIUM CAUSTIC is in good demand for export and little is obtainable for near delivery.

SODIUM HYPOSULPHITE continues extremely scarce and the price may be described as practically nominal.

SODIUM NITRITE is distinctly firmer and some of the heavy stocks recently on the market appear to have been absorbed, absorbed and higher prices would appear to be probable.

SODIUM PRUSSIATE continues a weak market and little business is reported.

SODIUM SULPHIDE continues very scarce and heavy premiums are paid for early delivery.

Coal Tar Intermediates

There is little fresh to report and the trade on the whole is without feature.

ANILINE OIL AND SALT continue in good demand, but licences are only being granted sparingly.

BELZIDINE BASE is in request and the one or two parcels appearing on the market are eagerly snapped up.

BETA NAPHTHOL is without change in value and any supplies appearing are readily absorbed at full figures.

DIPHENYLAMINE continues in request at recent rates.

H ACID is practically unobtainable for near delivery and business is reported at full prices to the end of this year.

NAPHTHIONATE OF SODA continues in request, but early delivery cannot be obtained.

PARANITRANILINE is without change and any supplies appearing are quickly absorbed.

PHTHALIC ANHYDRIDE continues weak with little demand.

RESORCIN has been in request, but supplies obtainable are very small.

Coal Tar Products

There is little change in our market since last week.

BENZOL, 90 per cent., is worth 3s. on rails.

PURE BENZOL.—The price is 3s. 3d. to 3s. 4d. per gallon.

CREOSOTE OIL remains firm at 1s. 1d. on rails in the North, and 1s. 1d. to 1s. 2d. in the South.

CRESYLIC ACID remains stationary at 4s. 6d. to 4s. 9d. per gallon for Pale 97-99 per cent. quality, and 4s. for Dark 95-97 per cent.

SOLVENT NAPHTHA is quoted 3s. 3d. per gallon, but very little business is being done.

HEAVY NAPHTHA is still about 3s. 6d. per gallon and supplies are difficult to obtain.

NAPHTHALENE remains steady at £16 to £20 per ton for Crude, Refined being worth £45 to £50 per ton.

PITCH.—Little business has been done during this week and prices are unchanged.

Sulphate of Ammonia

Home trade orders are coming in satisfactorily and the demand for Export remains stationary.

French Market Report

Business still continues stagnant with more sellers than buyers in evidence, manufacturers, however, still hold to their prices and production is comparatively very small, mainly owing to the shortage of fuel.

Stocks, on the other hand, appear to be very low, but with the present apathy on the part of buyers due in the main to the financial situation, and we are of opinion that a revival of this market cannot be looked for until the early autumn.

ACETONE has a fairly good market and is standing at about 850 francs per 100 kilos.

ACETIC ACID is in quietly steady demand at about 700 francs per 100 kilos for Glacial.

BORACIC ACID is only in small request at about 450 francs.

CITRIC ACID is very dull at about 325 francs.

LACTIC ACID is idle and the price declining and is standing to-day at about 450 francs.

OXALIC ACID is without feature at 14 francs per kilo.

TANNIC ACID is about 18 francs per kilo.

CHROME ALUM is in fair request at 800 francs per 100 kilos.

LUMP ALUM is very slow and price easy at 150 francs.

CARBONATE AMMONIA is idle without change in price.

BLEACHING POWDER is only in light request and is about 125 francs.

YELLOW PRUSSIATE OF POTASH is in better demand at 12 francs.

YELLOW PRUSSIATE OF SODA is working at about 9 francs per kilo.

LITHOPONE is only in moderate request and the price is inclined to sag, and may be taken to-day as being 325 francs.

SODIUM CAUSTIC is in fair supply and is about 150 francs.

SODIUM SULPHIDE is not so much inquired for and is about 300 francs per 100 kilos.

German Market Report

This market is very depressed and little business is reported. On the other hand, however, manufacturers have on the whole maintained their prices, and when the present stocks in outside speculators' hands have been cleared a revival would not appear to be improbable.

These outside stocks, however, are reported, especially in Fine Chemicals, to be very large, but a reliable estimate is impossible owing to the varying nature of the reports received.

ACID ACETIC is dull at about 8 marks per kilo for 80 per cent.

ACID LACTIC is lifeless, but a fair business is reported in the edible quality at about 6 marks 50 per kilo.

ACID OXALIC would appear to be a shade higher and is standing at approximately 25 marks per kilo.

ACID FORMIC is in quite steady demand at about 12 marks per kilo.

ACID CARBOLIC is a quiet market and the value may be taken at about 31 marks per kilo.

POTASSIUM SALTS are only in moderate request and better supplies are obtainable of Hydrate, while export licences would appear to be granted a little more freely. Sales of Hydrate have been reported at about 20 marks per kilo.

POTASSIUM BICHROMATE has been in request and is standing at about 42 marks per kilo.

SODIUM SALTS are fairly active and a good trade has been done in Caustic and Sulphide.

SODIUM BICHROMATE is 30 marks per kilo.

SODIUM HYPOSULPHITE is quiet at 5 marks per kilo.

Current Prices

Chemicals

	per	£	s.	d.		£	s.	d.
Acetic anhydride	lb.	0	3	9	to	0	4	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%	ton	110	0	0	to	115	0	0
Acetic, 80% pure	ton	90	0	0	to	92	10	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	1	3	to	0	1	3½
Citric	lb.	0	5	6	to	0	5	9
Fluoric	lb.	0	0	7½	to	0	0	8
Formic, 80%	ton	115	0	0	to	120	0	0
Gallic, pure	lb.		8	6	to	0	8	9
Hydrofluoric	lb.	0	0	7	to	0	0	8
Lactic, 50 vol.	ton	60	0	0	to	62	0	0
Lactic, 60 vol.	ton	72	10	0	to	75	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	2	5	to	0	2	6
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	10	to	0	3	0
Salicylic, B.P.	lb.	0	3	8	to	0	3	10
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	5	0	to	0	5	3
Tartaric	lb.	0	3	9	to	0	3	10
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	93	0	0	to	95	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	45	0	0	to	50	0	0
Ammonia, .920	ton	32	10	0	to	37	10	0
Ammonia, carbonate	lb.	0	0	7½	to	—		
Ammonia, chloride	ton	105	0	0	to	110	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	65	0	0	to	70	0	0
Ammonia, phosphate	ton	130	0	0	to	135	0	0
Ammonia, sulphocyanide	lb.	0	2	9	to	0	3	0
Amyl, acetate	ton	410	0	0	to	420	0	0
Arsenic, white, powdered	ton	70	0	0	to	73	0	0
Barium, carbonate, 92-94%	ton	13	10	0	to	14	0	0
Barium, chlorate	lb.	0	1	0	to	0	1	1
Chloride	ton	32	0	0	to	34	0	0
Nitrate	ton	55	0	0	to	56	0	0
Sulphate, blanc fixe, dry	ton	25	10	0	to	26	0	0
Barium, Sulphate, blanc fixe, pulp	ton	15	10	0	to	16	0	0
Sulphocyanide, 95%	ton	—			to	—		
Bleaching powder, 35-37%	ton	18	0	0	to	—		
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
,, Grey	ton	35	0	0	to	37	10	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	9	10	0	to	10	10	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	80	0	0	to	83	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	8	0	to	0	8	3
Oxide, black	lb.	0	10	0	to	0	10	3
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	43	0	0	to	44	0	0
Cream Tartar, 98-100%	ton	290	0	0	to	295	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol.	ton	345	0	0	to	350	0	0
Formusol (Rongalite)	lb.	0	4	0	to	0	4	3
Glauber salts	ton	Nominal.						
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	8	to	0	2	9
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	15	0	to	5	0	0
Lead acetate, white	ton	90	0	0	to	92	10	0
Carbonate (White Lead)	ton	70	0	0	to	72	10	0
Nitrate	ton	72	0	0	to	75	0	0
Litharge	ton	62	10	0	to	65	0	0
Lithopone, 30%	ton	55	0	0	to	56	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	14	0	0	to	14	10	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to	—		
Sulphate	ton	105	0	0	to	110	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.	Nominal.						
Nickel ammonium sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	2	2	to	0	2	3
Potassium Carbonate, 90%	ton	115	0	0	to	120	0	0
Chloride	ton	Nominal.						
Chlorate	lb.	0	0	10	to	0	0	10½
Meta-bisulphite, 50-52%	ton	270	0	0	to	280	0	0
Nitrate, refined	ton	70	0	0	to	72	0	0
Permanganate	lb.	0	5	9	to	0	6	0
Prussiate, red	lb.	0	5	3	to	0	5	6
Prussiate, yellow	lb.	0	2	3	to	0	2	4
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	15	0	to	—		
Seconds	cwt.	6	0	0	to	—		
Sodium acetate	ton	61	0	0	to	63	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	9	to	11	0	0
Bichromate	lb.	0	1	11	to	0	2	0
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0
Chlorate	lb.	0	0	5¾	to	0	0	6¼
Caustic, 70%	ton	43	0	0	to	45	0	0
Caustic, 76%	ton	46	0	0	to	47	0	0
Hydrosulphite, powder, 85%	lb.	0	4	0	to	0	5	0
Hyposulphite, commercial	ton	37	10	0	to	40	0	0
Nitrite, 96-98%	ton	100	0	0	to	105	0	0
Phosphate, crystal	ton	42	0	0	to	44	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	5½	to	0	1	6½
Sulphide, crystals	ton	30	0	0	to	32	0	0
Sulphide, solid, 60-62%	ton	62	10	0	to	65	0	0
Sodium Sulphite, cryst.	ton	15	10	0	to	16	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	24	0	0	to	26	0	0
Roll	ton	24	0	0	to	26	0	0
Tartar emetic	lb.	0	3	4	to	0	3	5
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	82	10	0	to	85	0	0
Oxide, 94-95%	ton	70	0	0	to	72	10	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

	per	£ s. d.		£ s. d.
Alphanaphthol, crude	lb.	0 4 0	to	0 4 3
Alphanaphthol, refined	lb.	0 5 6	to	0 5 9
Alphanaphthylamine	lb.	0 4 0	to	0 4 3
Aniline oil, drums extra	lb.	0 1 8	to	0 1 9
Aniline salts	lb.	0 1 10	to	0 2 0
Anthracene, 85-90%	lb.	—	to	—
Benzaldehyde (free of chlorine)	lb.	0 5 6	to	0 6 0
Benzidine, base	lb.	0 13 6	to	0 14 0
Benzidine, sulphate	lb.	0 10 6	to	0 11 0
Benzoic, acid	lb.	0 5 6	to	0 6 0
Benzoate of soda	lb.	0 5 6	to	0 6 0
Benzyl chloride, technical	lb.	0 2 0	to	0 2 3
Betanaphthol benzoate	lb.	1 6 0	to	1 7 6
Betanaphthol	lb.	0 5 6	to	0 5 9
Betanaphthylamine, technical	lb.	0 11 6	to	0 12 6
Croceine Acid, 100% basis	lb	0 5 0	to	0 6 3
Dichlorbenzol	lb.	0 0 6	to	0 0 7
Diethylaniline	lb.	0 7 9	to	0 8 6
Dinitrobenzol	lb.	0 1 5	to	0 1 6
Dinitrochlorbenzol	lb.	0 1 5	to	0 1 6
Dinitronaphthaline	lb.	0 1 4	to	0 1 6
Dinitrotoluol	lb.	0 1 8	to	0 1 9
Dinitrophenol	lb.	0 2 3	to	0 2 6
Dimethylaniline	lb.	0 5 0	to	0 5 6
Diphenylamine	lb.	0 5 0	to	0 5 3
H-Acid	lb.	0 14 6	to	0 15 0
Metaphenylenediamine	lb.	0 5 9	to	0 6 0
Monochlorbenzol	lb.	0 0 10	to	0 1 0
Metanilic Acid	lb.	0 7 6	to	0 8 6
Monosulphonic Acid (2:7)	lb.	0 7 6	to	0 8 0
Naphthionic acid, crude	lb.	0 5 6	to	0 6 0
Naphthionate of Soda	lb.	0 6 0	to	0 6 6
Naphthylamin-di-sulphonic-acid	lb.	0 5 6	to	0 6 6
Nitronaphthaline	lb.	0 1 3	to	0 1 4
Nitrotoluol	lb.	0 1 4	to	0 1 6
Orthoamidophenol, base	lb.	0 18 0	to	1 0 0
Orthodichlorbenzol	lb.	0 1 2	to	0 1 4
Orthotoluidine	lb.	0 2 6	to	0 2 9
Orthonitrotoluol	lb.	0 1 7	to	0 1 8
Para-amidophenol, base	lb.	0 15 0	to	0 16 0
Para-amidophenol, hydrochlor	lb	0 15 6	to	0 16 6
Paradichlorbenzol	lb.	0 0 6	to	0 0 8
Paranitraniline	lb.	0 8 6	to	0 9 0
Paranitrophenol	lb.	0 2 6	to	0 2 9
Paranitrotoluol	lb.	0 5 3	to	0 5 6
Paraphenylenediamine, distilled	lb.	0 13 6	to	0 14 6
Paratoluidine	lb.	0 8 6	to	0 9 6
Phthalic anhydride	lb.	0 4 9	to	0 5 0
R. Salt, 100% basis	lb.	0 4 0	to	0 4 2
Resorcin, technical	lb.	0 11 6	to	0 12 6
Resorcin, pure	lb.	0 17 6	to	1 0 0
Salol	lb.	0 5 9	to	0 6 0
Shaeffer acid, 100% basis	lb.	0 3 6	to	0 3 0
Sulphanilic acid, crude	lb.	0 1 5	to	0 1 6
Tolidine, base	lb.	0 10 6	to	0 11 6
Tolidine, mixture	lb.	0 3 0	to	0 3 6

Extending Trade with China

WE understand that Mr. H. H. Fox, C.M.G., F.R.G.S., H.M Commercial Counsellor for China, who has recently arrived in this country, is at present at the Department of Overseas Trade interviewing firms in London who are desirous of obtaining information as to the possibilities of extending their trade in China, and who wish to take this opportunity of consulting him on any matters connected with their business with that country. London firms who are desirous of consulting Mr. Fox should communicate with the Department of Overseas Trade, 35, Old Queen Street, S.W.1.

It is proposed in accordance with the established practice, that a tour shall be undertaken by Mr. Fox of certain industrial areas in the United Kingdom, during the months of September and October, when the following cities will probably be visited: Coventry, Birmingham, Wolverhampton, Leicester, Nottingham, Sheffield, Manchester, Leeds, Bradford, Belfast, Glasgow, Newcastle, and Hull.

Mr. Fox will be pleased to meet manufacturers and merchants who wish to consult him in regard to steps to be taken for opening up trade with China, and who are desirous of obtaining advice and information as to the state of trade in that country. Provincial firms desirous of meeting Mr. Fox should communicate either with the Department of Overseas Trade, or with the Secretary of their local Chamber of Commerce.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

Locality of Firm or Agent.	Materials.	Ref. No.
Australia	Wholesale druggists	2
Brussels	Vegetable oil; soap; candles	11
Milan	Paints; varnishes	17
Turin	Glassware	18
Madrid	Glass bottles; paints; varnishes	22
France and Colonies	Chemicals; Pharmaceutical Products	53
Egypt (Alexandria)	Chemicals; Paints; Oils	48
Bulgaria (Sofia)	Chemicals	51
Canada (Montreal)	Drugs	833
Italy (Turin & Milan)	Chemical and Pharmaceutical Products	59
Italy (Genoa)	Industrial Chemicals; Oils	60
Serb-Croat Slovene States	Druggists' Sundries	64
Sweden (Gothenburg	Chemicals	65
New York and Boston	Chemicals; Essential Oils; mica	73
Mexico	Anilines; Drugs; Chemicals, &c.	78
New Zealand	Chemists' & Druggists' Sundries	42
Ecuador	Anilines; Drugs; Medicinal Chemicals; White Zinc Paints; Varnishes, &c.	—

The officer in-charge of the office of H.M. Senior Trade Commissioner in Australia has forwarded copies of the specifications, tender forms, &c., in connection with a call for tenders by the Postmaster-General's Department, Melbourne, for the supply and delivery of ammonium chloride. (Schedule No. 1,626.) Tenders close at 3 p.m. on July 20. Tenders must be accompanied by a deposit of 2 per cent. on the first £500, and of 1 per cent. on the amount above that sum (minimum deposit £2). Local representation is necessary. Copies of the above-mentioned specifications, &c., may be consulted at the Department of Overseas Trade (Room 59), 35, Old Queen Street, London, S.W.1, and at the Enquiry Office, 73, Basinghall Street, London, E.C.2. It will be observed that the time for the receipt of tenders is limited, and this intimation, therefore, will be of use only to firms having agents in the Commonwealth who can be instructed by cable.

Proposed Revision of Railway Rates

The Rates Advisory Committee of the Ministry of Transport, at Lincoln's Inn Old Hall, on Wednesday, heard the railway companies' case for higher goods rates. Mr. R. L. Wedgwood, chief goods manager of the North-Eastern Railway, and chairman of the Goods Managers' Conference, in giving evidence said that, on the basis of a 72 millions deficit, and assuming that three-fifths had to be raised from goods, a little more than 43 millions would have to come from freight rate. The railway companies' scheme, he added, was practically unanimous. From coal, coke and patent fuel they proposed to raise over 23 millions, and the remainder from the other classes of traffic. Coal traffic was subjected to a 37 per cent. increase in January, 1920, and that would now be raised to 102¾ or 103 per cent. Class A traffic, subjected to a 35 per cent. increase in January, 1920, would now be subjected to 101 per cent. increase on the 1919 basis, the pre-war level of rates. Class B, which was 33 per cent. up in January, 1920, would be 111 per cent. up. In Class C, where the increase in January was 52 per cent., it would be brought up to 107 per cent. In Classes 1 to 5, which went up 74 per cent. in January, the increase would be 115 per cent. The average increase on all traffic was 55 per cent. in January, 1920, and it would now be 112 per cent. under their proposal.

Sale of "Zotal" in Spain

Spanish Chemist's Claim Against English Firm

IN the King's Bench Division on Tuesday last the Lord Chief Justice and a special jury began the hearing of an action brought against Burgoyne, Burbidges & Co., of High Street, South East Ham, manufacturing chemists, by José Maria Gutierrez Espinar, chemist, of Seville, Spain. Senor Espinar claimed a large sum as damages for breach of agreement and alleged libel in connection with the sale of a disinfectant called "Zotal" in Spain.

From the opening speech of Mr. Schiller, K.C. (for the plaintiff), it appeared that Mr. Espinar had invented and advertised for sale a disinfectant named "Germol," but by an agreement dated May 1, 1914, he agreed to cancel at once the sale of that product and to deal exclusively for the defendants with the exploitation and sale of "Zotal," this product was the sole property of the defendants, and they owned the trade mark. Plaintiff was to do all he could to exploit the sale of "Zotal" for 10 years, and to avoid expense he was authorised to manufacture "Zotal" in his laboratory in Seville from the defendants' secret formula. All packages and advertisements were to bear the defendants' name and Mr. Espinar was to appear as sole concessionaire and to form a company for the exploitation of the disinfectant if necessary. He was also to pay the defendants £320 per annum as a minimum for the sale of 50,000 kilos of "Zotal" and more pro rata if the sale went higher. Plaintiff, in accordance with that agreement paid the first £320 in advance, cancelled all work in connection with his "Germol" and commenced to act in the defendants interests. Then defendants repudiated the contract, with the result that plaintiff had lost the benefit of it and the profits for his own business. In addition, they had published in two Seville newspapers a statement which plaintiff said was libellous, inasmuch as it said plaintiff had falsely announced that he had a sole right to deal with "Zotal" in Spain, and had obtained the contract by fraud. The defendants had given the contract to sell "Zotal" to other people in Spain. By their defence Burgoyne, Burbidge & Co. admitted the contract, but pleaded that a condition precedent had not been carried out. That condition was that the plaintiff should obtain from the heirs of a Senor Torre the transfer of the Spanish trade-mark "Zotal," and if the transfer could not be carried out amicably he should take legal steps to enforce the transfer. With regard to the libel the defendants pleaded that it had no defamatory meaning.

The plaintiff, in his evidence, said the sale of his "Germol" had had good results, and was profitable when he cancelled it for the exploitation of defendants' "Zotal." By abandoning the sale of "Germol" he lost between £1,000 and £1,500 a year.

What is "Legitimate" in Spain.

Replying to Mr. Hogg, K.C. (for the defendants), plaintiff said that in 1907 he gave his brother-in-law a power of attorney, but that was so that he might dispose of his trade marks, which included "Zotal," "Izal" and a disinfectant called "Chicago."

Mr. Hogg: Do you claim that you invented "Izal"? No, I registered it to avoid competition.

To prevent the owners of "Izal" from selling the product in Spain you registered the name yourself?—Yes, but without any motive of exploiting it.

His Lordship: Why did you register another person's property as your own?—To prevent competition.

To prevent others selling it when the owners came along?—Yes, that is quite legitimate in Spain. He added that somebody else had been selling "Chicago" or something under that name, so he registered the name as being his, so that he might prevent others from selling it.

Mr. Hogg: So that the owner might not be able to sell his own product?—Yes, the seller was not a chemist, and only a chemist can register.

By so doing you prevented the owner from selling it?—Yes, he was a competitor (laughter).

You authorised your brother to sell trade marks, viz., "Zotal," belonging to the defendants; "Izal," belonging to Messrs. Newton, Chambers; and "Chicago," belonging to somebody else?—I did not authorise him to sell but he did so, and when I asked him for the money he laughed at me. He added that after having been registered for 3 years it was the law of Spain that the owner could not be dispossessed. "Zotal" was sold to a Senor Torre and he thought if he brought that gentleman's heirs to Court they would give it up. As a matter of fact, he thought when Senor Torre died the trade mark would revert to the defendants.

Mr. Hogg, for defendants, said there was no doubt that the defendants were the possessors of the trade mark "Zotal" in 1900, that in the same year they made an arrangement with the plaintiff, under which he was to sell their disinfectant for them in Spain, and that plaintiff registered himself in Spain as the owner of the trade mark, and the exclusive proprietor of it. For seven years he got "Zotal" from defendants and sold it in Spain. Plaintiff seemed to have a peculiar idea about commercial morality, and not only had he registered "Zotal" as his property, but he had registered "Izal" and "Chicago," trade marks belonging to other people. He did not tell those people that by so doing he could prevent them from selling their own stuff in Spain, although he could sell any sort of thing under the trade name. In 1908 the plaintiff found himself financially embarrassed, and he left for Mexico. Before he went he authorised his brother-in-law to hold the trade marks, and his brother-in-law sold them. "Zotal" he disposed of to a Senor Tehero for £20. The defendants got none of that money. Consequently, the only person who could sell "Zotal" in Spain was Senor Tehera, and he could not sell the proper stuff because he could not get it. So he wrote the defendants, and told them the circumstances, and obtained a promise that he should be their exclusive agent. Meanwhile, the plaintiff was selling and advertising "Germol" as being better than "Zotal." Then Tehera died, and his heirs carried on the sale of "Zotal." In 1914 the plaintiff approached the defendants with somewhat of a mixture of inducements and threats, said he would push "Germol" if defendants did not revert to him the contract to sell "Zotal." They agreed again to give plaintiff the agency if he could obtain the trade mark. The contract that was now sued upon was signed; but it was not to be operative till plaintiff got the trade mark back. Tehera's heirs maintained their right to the trade mark, and threatened defendants with proceedings if they ceased to send the disinfectant for sale. Defendants were between two stools, and as plaintiff had not carried out the condition precedent to the contract, the defendants repudiated the contract.

The further hearing was adjourned.

A Sodium Sulphide Contract

Damages According to Foreign Currency

IN the Court of Appeal on Tuesday, the action of Riva di Ferdinando v. Simon Smith & Co., Ltd., raised the question how damages should be assessed in the case of a judgment dependent on the value of a foreign currency—a matter of considerable importance to commercial litigants, owing to the recent, and the present, fluctuations in the rate of exchange.

The plaintiff, a merchant in Milan, had bought 25 tons of sodium sulphide, and he instructed the defendants, shipping agents in London, to carry it to Milan for delivery to him. The sulphide, in accordance with the plaintiff's instructions, was received by the defendants, but it was never delivered to the plaintiff, who had sued them for damages for non-delivery. Mr. Justice Roche, who tried the action, held that there had been a breach of contract and a conversion by the defendants of the goods which had been entrusted to them, and he assessed the loss to the plaintiff from the date when the sulphide ought to have been delivered in Milan, ascertaining the price accordingly. The result was that the plaintiff was entitled to the value of the sulphide on February 10, 1919, that was, 190 lire in Italian currency per 100 kilos, a total of 42,212 lire, which on that date were equivalent in value to £1,550 English money, and judgment was given accordingly. At the date of the judgment the price, by reason of the variation in the exchange, was 62 lire per 100 kilos, and the loss to the plaintiff, if ascertained then, would have been only £780. It was contended on behalf of the defendants that that was the full amount of their liability, and they appealed.

The Court, without calling on counsel for the plaintiff, dismissed the appeal.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Notice of Intended Dividend

CARTER, WILLIAM, "Clar mont," Portland Road, East Grinstead, Sussex, chemist. July 23. Trustee, L. A. West, official receiver, 12A, Marlborough Place, Brighton.

Companies Winding Up Voluntarily

V.C. GLASS MANUFACTURING CO., LTD.—Liquidators, E. H. Hawkins, 4, Charterhouse Square, London, E.C., accountant; and L. Gordon Mellor, Finsbury Court, Finsbury Pavement, London, E.C., chartered accountant.

BRITISH MEDICINAL OIL REFINERS, LTD.—A meeting of creditors will be held at 95, Cannon Street, London, E.C. 4, on Saturday, July 17, 1920, at 11 a.m. C. J. Gladwell, Liquidator.

LONDON PHARMACEUTICAL REFINERS, LTD.—Liquidator, C. J. Gladwell, 95, Cannon Street, E.C.

County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

BROOKS, H., Nightingale Lane, Hitchin, chemist. £10. 6s June 1.

DYBALL, THOMAS W., 83, Christchurch Street, Ipswich, chemist. £23. 2s. 11d. June 5.

HARRISON, JOSEPH ALFRED, and his wife, 36, Robin Lane, Pudsey, chemist. £14. 14s. 2d. June 10.

Company News

COURTAULDS.—An interim dividend has been declared of 3s. 6d. per share, free of income tax, payable August 5 (against 4s. per share last year).

CANADIAN EXPLOSIVES.—The directors have declared a dividend of 1¾ per cent. on the 7 per cent. cumulative preferred shares for the quarter ended June 30, 1920, payable July 15.

ASSAM OIL.—The profit for 1919 amounted to £81,697, against £85,848 in 1918. The ordinary dividend is maintained at 8 per cent., less tax, and the preference shares again receive an extra 1 per cent. (making 8 per cent., less tax).

ZINC CORPORATION.—A dividend of 2s. per share has been declared on the preference shares, being the first half of the fixed preferential dividend of 20 per cent. for the year 1920, payable on July 30, less tax, at 3s. 6d. in the £.

EXPLOSIVES TRADES, LTD.—Sir Harry McGowan (chairman and managing director) presided at the general meeting of Explosives Trades, Ltd., at Winchester House, Old Broad-street, E.C., last week. About three years ago the management of the principal companies now forming Explosives Trades, Limited, recognised the necessity of securing a financial identity of interests if the problems which would arise at the termination of the war were to be handled in a scientific manner. Various foreign manufacturers of explosives and kindred commodities, notably in Germany, had formed then selves into powerful combinations, and it was felt that British interests must be similarly consolidated if they were to maintain and improve their position in the future. The task of merging was duly accomplished, and Explosives Trades, Ltd., was incorporated on November 29, 1918, with effect, so far as the shares were concerned, at January 1 of that year. In moving the adoption of the report and accounts Sir Harry said the sums received as dividends from their constituent companies out of their trading results for the two years 1918 and 1919, after deduction of income tax, gave the company a net balance from the profit and loss account of £1,655,241. A dividend of 9 per cent. was paid on the ordinary shares in July of last year out of the dividends received for the year 1918, and after meeting the dividend charge upon the preference shares for 1919 they proposed a dividend of 10 per cent. on the ordinary shares and 5 per cent. on the deferred shares in respect of the trading of 1919, leaving £231,472 to be carried forward. The amount of this carry forward does not represent the full surplus from the trading of the companies forming the merger, as the whole of the profits made since the date as from which the merger took effect have not been declared as dividend, substantial sums remaining with the constituent companies. The report and accounts were adopted, and dividends as above were declared.

Benn Brothers Journals

Some Features of the Current Issues

AERONAUTICS.

Dinner to the Pioneers (full report); "A New Theory of the Screw Propeller," by M. A. S. Riach; "The Conversion of the *Daily Mail*."

THE CABINET MAKER.

"Furniture at the Empire Timber Exhibition"; "A Half-year's Exports of Furnishings"; "The Modern Chesterfield Frame and its Treatment."

THE ELECTRICIAN.

"Electrical Device for Checking Oil Temperature of Medium-sized Turbo-generators," by G. F. Duckett; "Three Magnetically-coupled Circuits," by E. Bellini; "Electric Railway Contact Systems," by Sir Phillip Dawson (concluded).

THE FRUIT-GROWER.

"Economic Fruit Growing"; "Control and Encouraging Production;" "The State and the Land."

THE GAS WORLD.

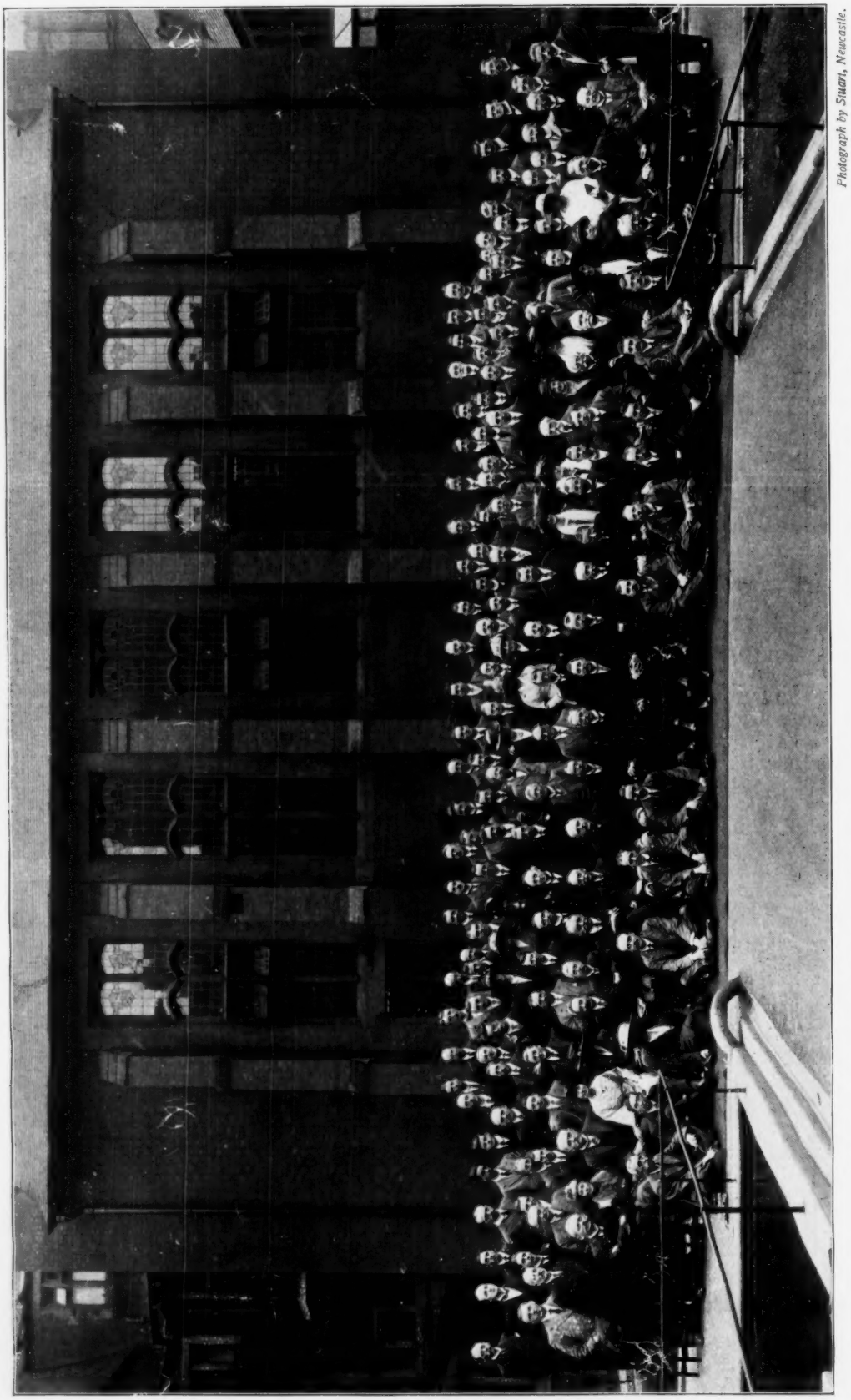
"Installation Gas Costs in Factories"; "The Public and Wage Demands of Gas Workers"; "Society of Chemical Industry and Coke Ovens."

THE HARDWARE TRADE JOURNAL.

"Punching Small Holes"; "Electric Pocket Lamps"; "The Outlook for Hardware Exporter."

WAYS AND MEANS.

"Minimum and Competitive Wages," by Professor A. L. Bowley; "More Co-partnership," by H. Cooper; and "Rural Education for Women," by Mrs. B. M. Marshall.



Photograph by Stuart, Newcastle.

SOCIETY OF CHEMICAL INDUSTRY: CONFERENCE GROUP AT THE NEWCASTLE ANNUAL MEETING.